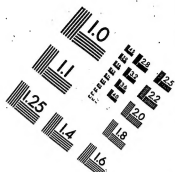
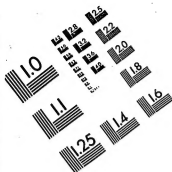




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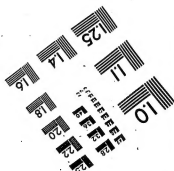
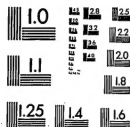
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A SELECTIVE MICROFILM EDITION
PART II
(1879-1886)

REEL 45

NOTEBOOK SERIES (NBK-23)

Oversize Notes and Drawings
Undated Notes and Drawings

PATENT SERIES (PAT-2)

OVERSIZE NOTES AND DRAWINGS, 1879-1886

The Oversize Notes and Drawings contain 120 technical documents, primarily drawings, that are too large to fit in standard-size document folders and, in most cases, too large to be filmed at the standard reduction ratio of 14:1. They cover a variety of subjects, but most relate to electric lighting. A few drawings concern telephones and electric railways. Included also is a set of Menlo Park machine shop drawings, dating from 1879 and 1880. These drawings were produced by the staff of the laboratory's machine shop prior to the production of experimental devices and models. Almost all of the drawings relate to work on the electric light but there are a few miscellaneous drawings of the telephone. In order to preserve the integrity of the collection, the few standard-size machine shop drawings have also been filmed on this reel.

The documents appear on the microfilm in the following order:

1. Miscellaneous Notes and Drawings, 1879-1886
2. Miscellaneous Notes and Drawings, Undated
3. Menlo Park Machine Shop Drawings, 1879-1880
4. Menlo Park Machine Shop Drawings, Undated
5. Oversize Drawings from the Charles Batchelor Collection, 1884

MISCELLANEOUS NOTES AND DRAWINGS, 1879-1886

(Reduction Ratio = 18:1)

Edison's Laboratory
 Made Patent Model of
 Oct 10th 1878
 A. D. Mott & Co.

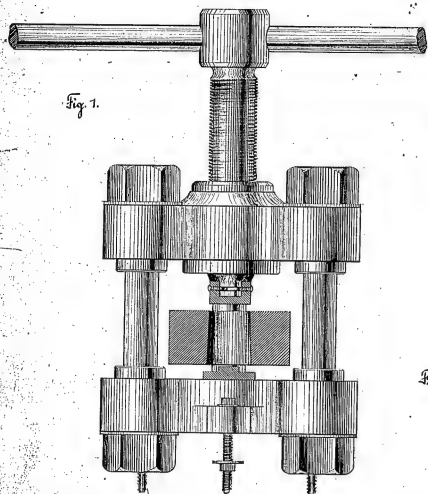


Fig. 1.

Fig. 4.

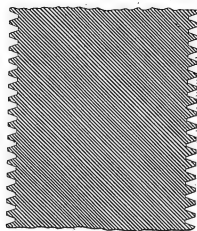
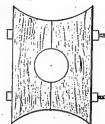


Fig. 3.

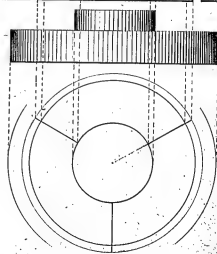
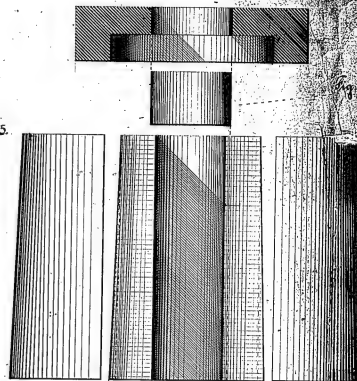


The Chalk Cylinder Press.

Fig. 2.



Fig. 5.



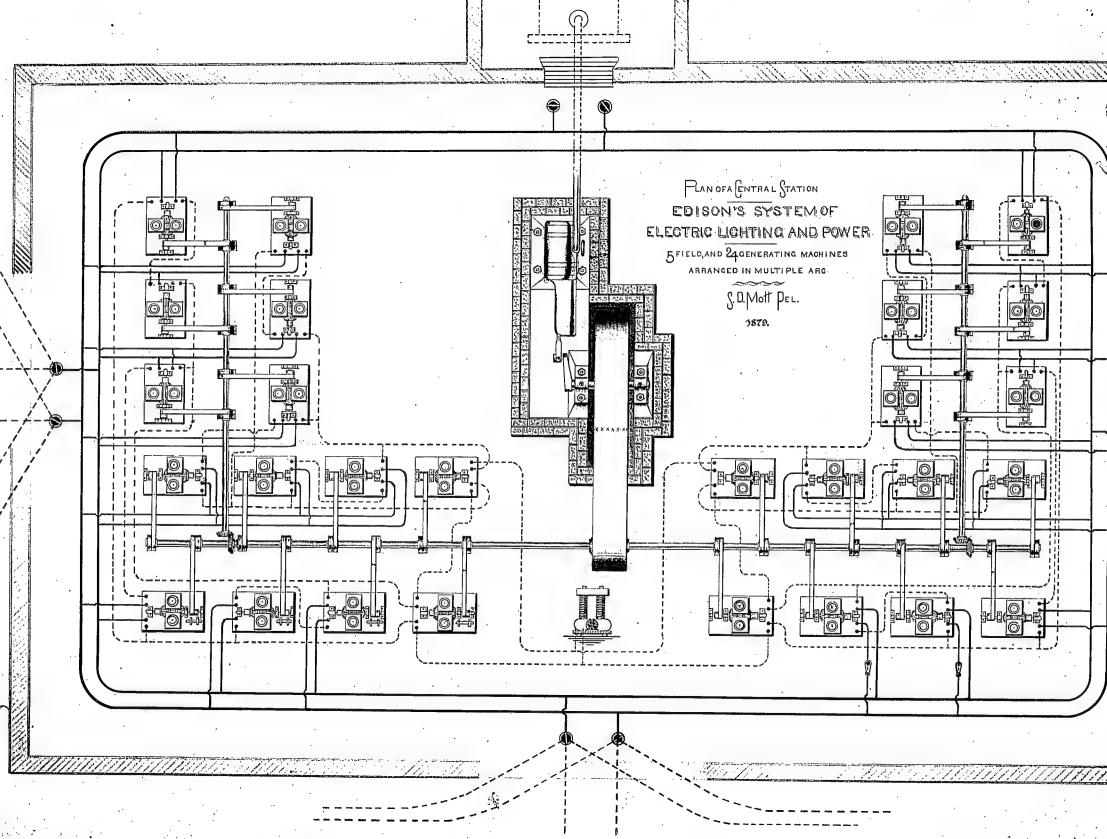
- Fig. 1. Press reduced $\frac{1}{4}$ (ring in section)
 Fig. 2. Extra lever, reduced $\frac{1}{4}$.
 Fig. 3. Blocks in position on the ring.
 Fig. 4. The screw in section full size.
 Fig. 5. Elevation & projection of the mount.
 Fig. 6. Four such buttons (full size).

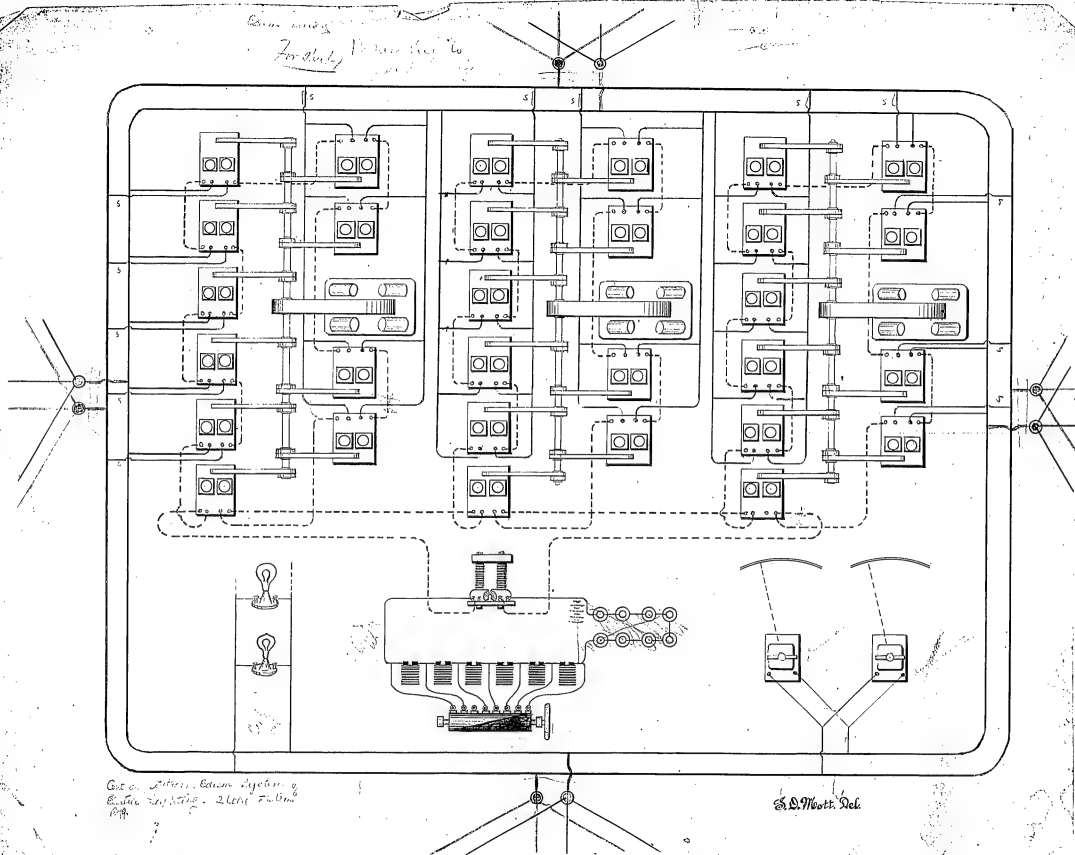
Edison's Central Station Plan

PLAN OF A CENTRAL STATION
EDISON'S SYSTEM OF
ELECTRIC LIGHTING AND POWER
5 FIELD, AND 24 GENERATING MACHINES
ARRANGED IN MULTIPLE ARC

S. J. Mott DEL.

1879.





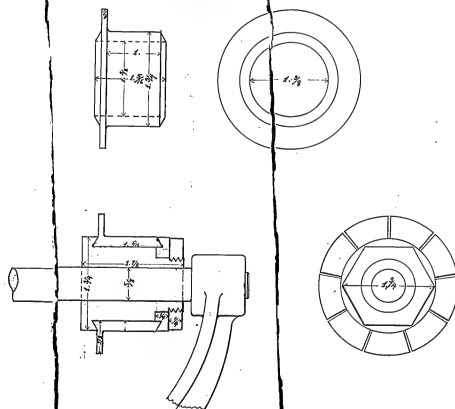
Cont. c. *Antenn.*, *Edmon. System.* of
Entom. Soc., 1891. 2 vols. 100 pp.

S. D. Mott. Del

OFFICE OF THE
EDISON ELECTRIC LIGHT CO.,
65, 5th. AVENUE,
NEW YORK.

NOT TO BE TAKEN
FROM THE
OFFICE.

ORIGINAL,
April 21, 1879



OFFICE OF THE
EDISON ELECTRIC LIGHT CO.,
65, 5TH AVENUE,
NEW YORK.

ORIGINAL,

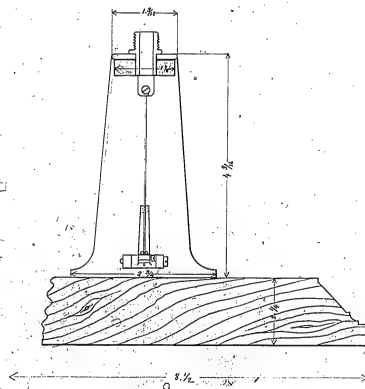
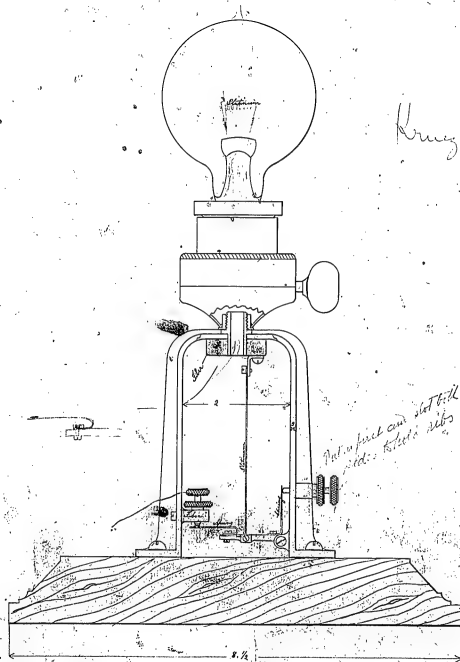
NOT TO BE TAKEN
FROM THE
OFFICE

May. 11. 1879.

Put in two binding posts.

Make one of this

John. F. C. C.

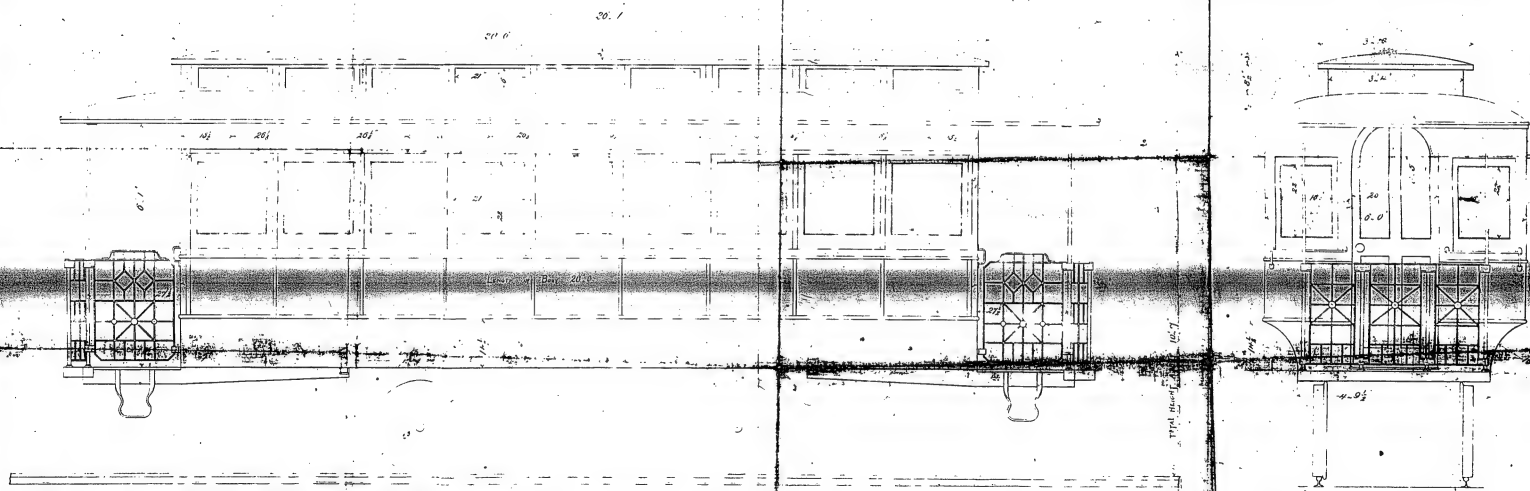


Passenger Car for
Edison's Electric Rail Road

Scale: $\frac{1}{4}$ " per foot

65 - 116 Ave, N.Y. City

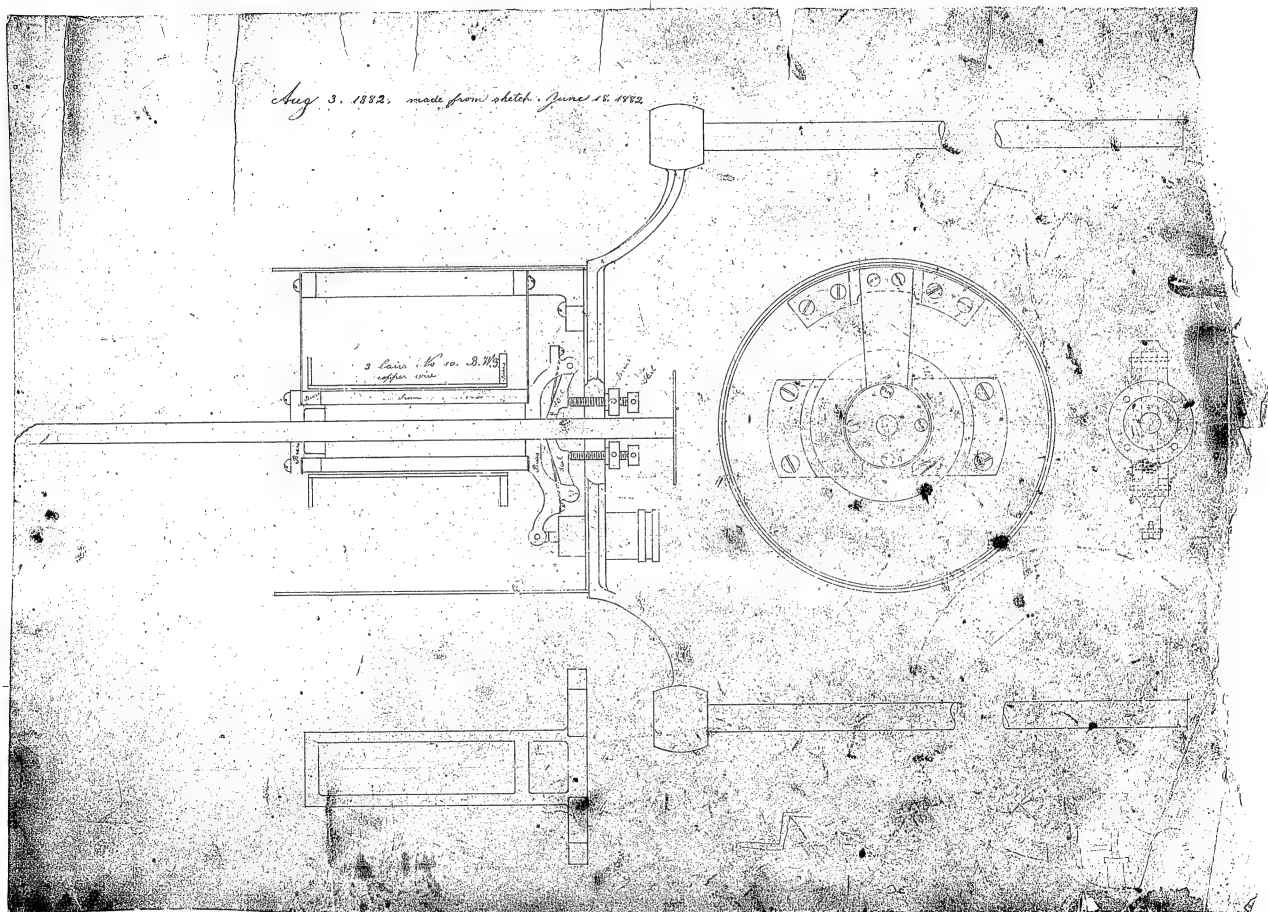
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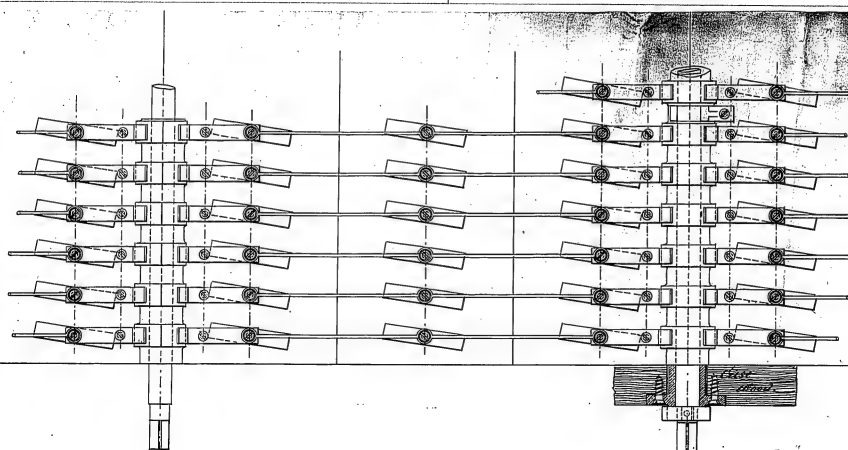


24

Q. 24-57

Aug 3. 1882. made from sketch June 16. 1882.



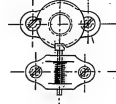


*Switch for Automatic Field Regulator
for 3 K. Dynamos.*

Full Size.

August, 16th 1893.

P. V. Wagon.



*Engineering Department
Ed. M. L. & Co.
65 Pittsford N. Y.*

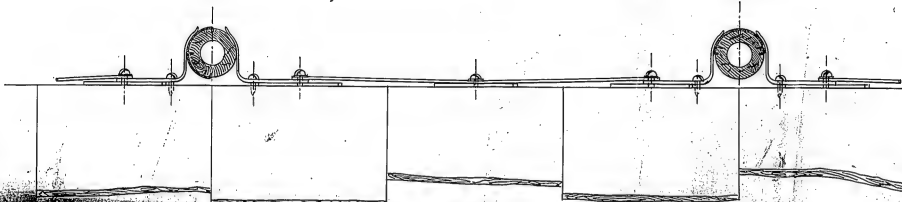


Fig. 2

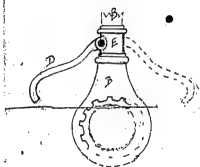


Fig. 1

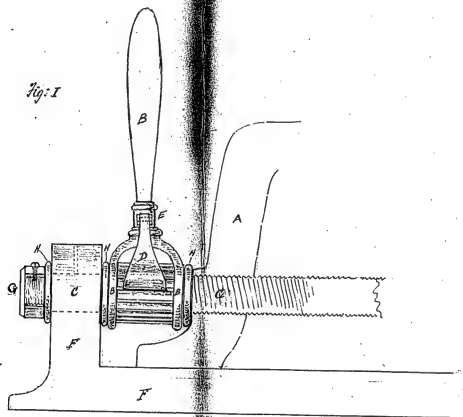


Fig. 1 to rectify

Suggestion for improved Self-Righting for Dynamo mechanism.

Fig. 1 - A. Section of Dynamo base.

B. A lever, & with an, attached principle, to turn the screw C, to turn right or left & fixed so, when the Dynamo.

D. Is a filament hinged into the collar E, & cross section in Fig. 3.

E. Is a revolving collar upon the lever B, enabling the filament D, to be raised & placed to right or left of the egg drum.

F. The frame of rails, upon which the dynamo rests.

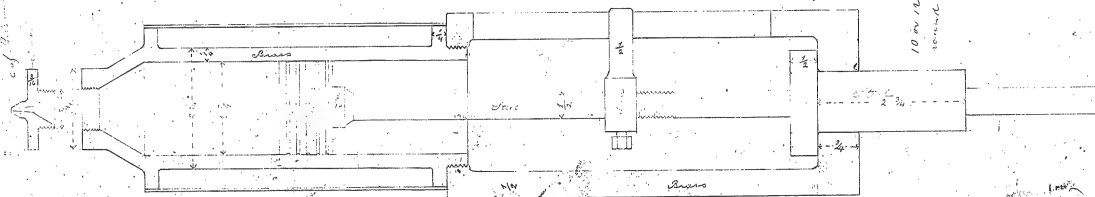
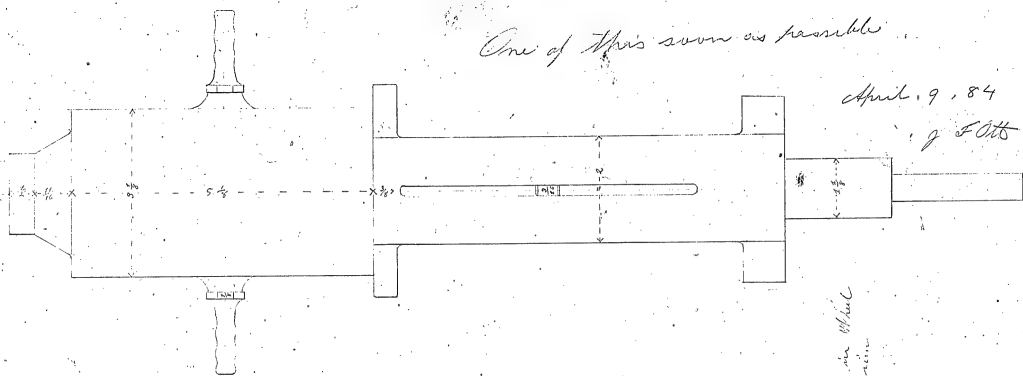
G. A nut to screw on to the pointed end of screw C, to give a bearing when turning back the Dynamo.

H. H. Are washers.

One of this soon as possible

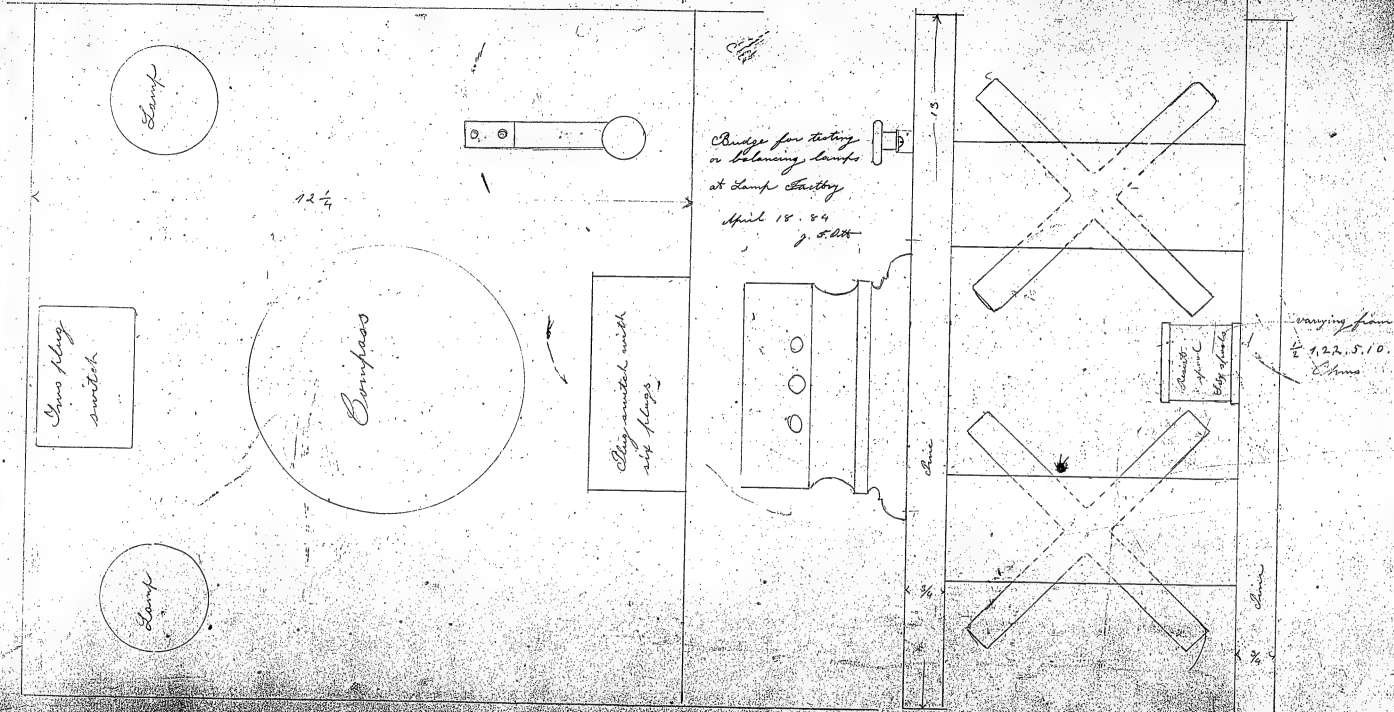
April 9, 84

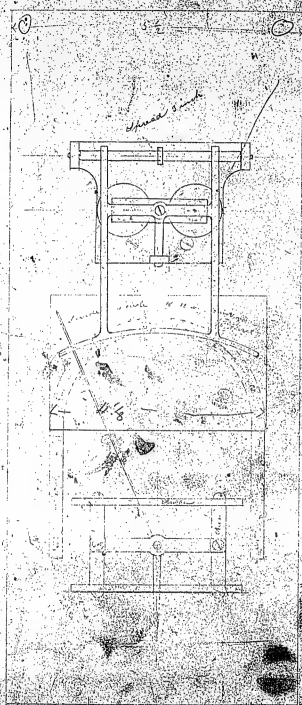
J. F. Ott



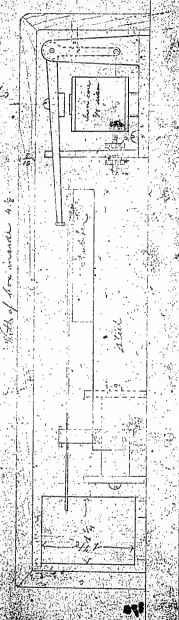
3 1/2"

Ref. 3-4





Hand 3 inch
 1125 and 1126
 with 1127

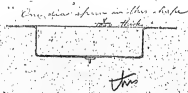
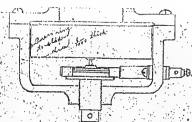
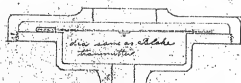


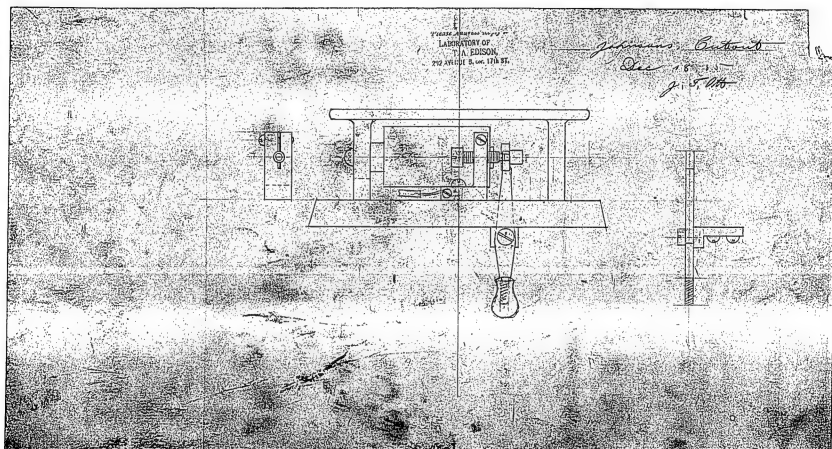
L

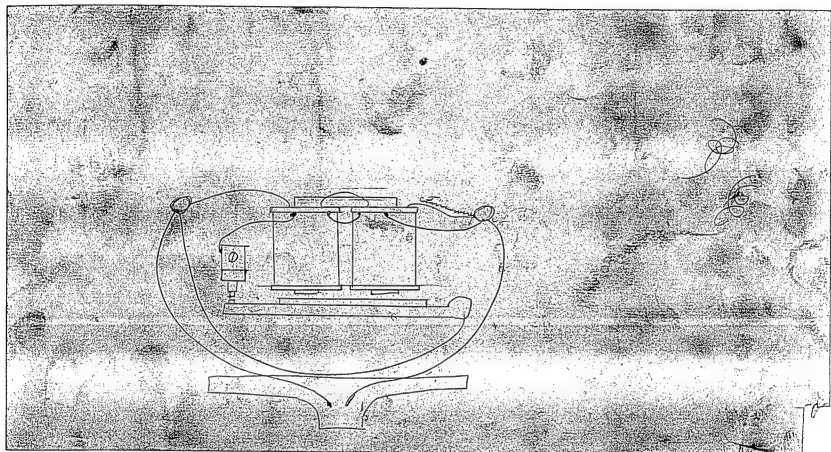
Hand 3 inch

April 9 1885
J. S. Holt

946

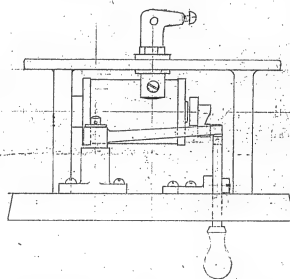
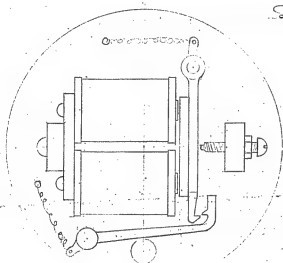


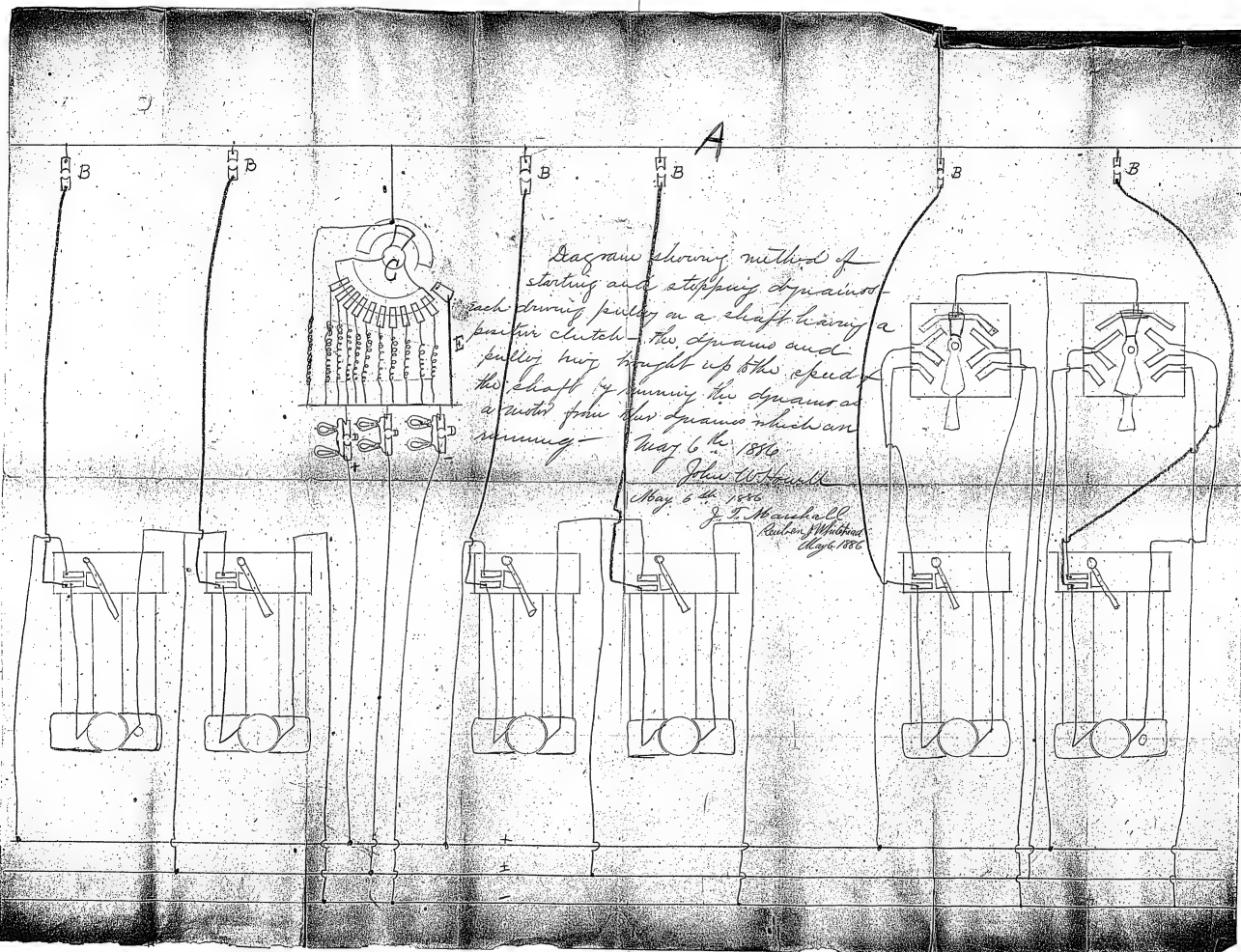


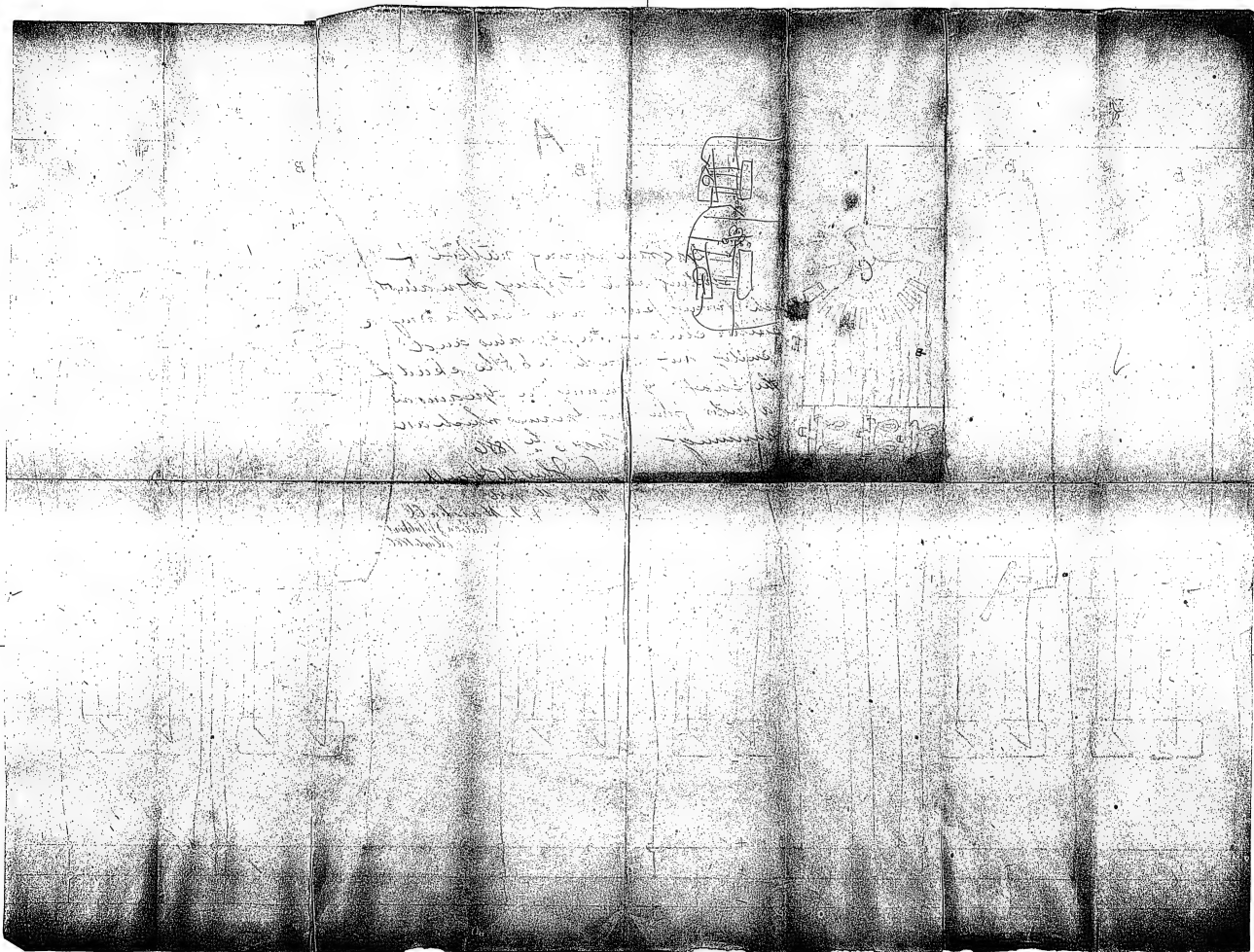


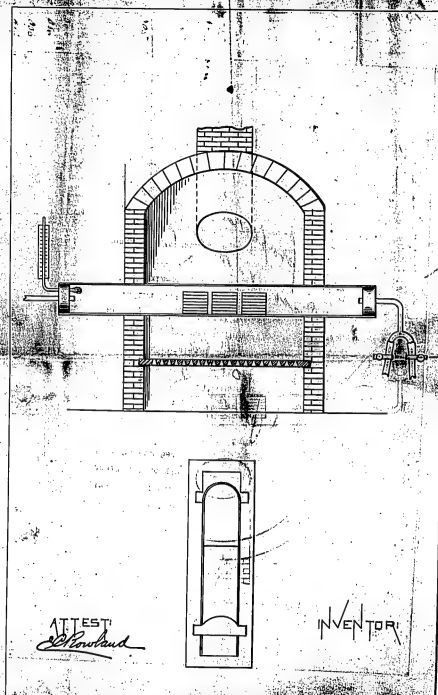
LAWYER OF
T. A. ENSON,
202 AVENUE D, NEW YORK, N.Y.

Dec. 11, 1911







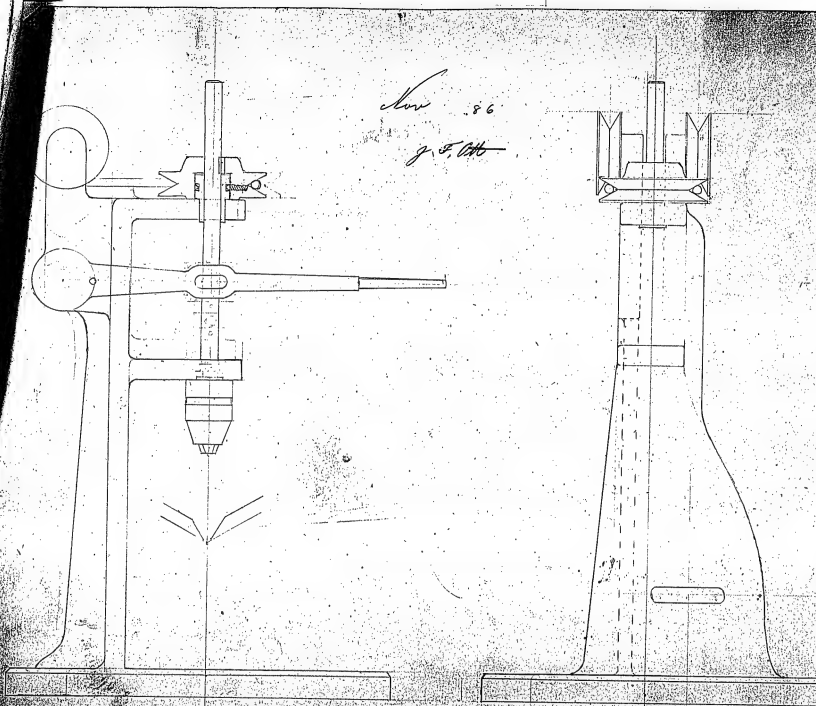


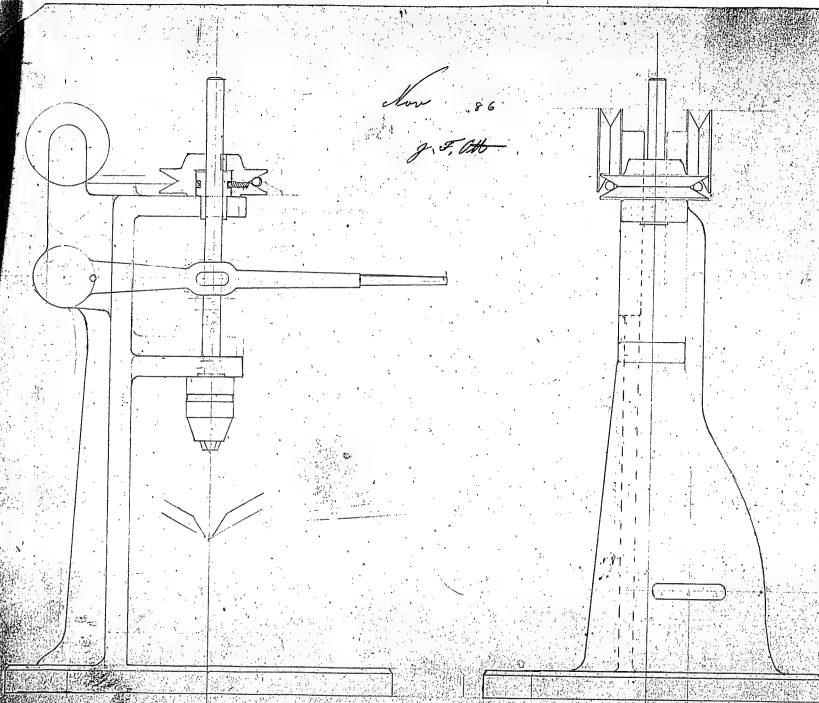
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Howard

INVENTOR
Howard

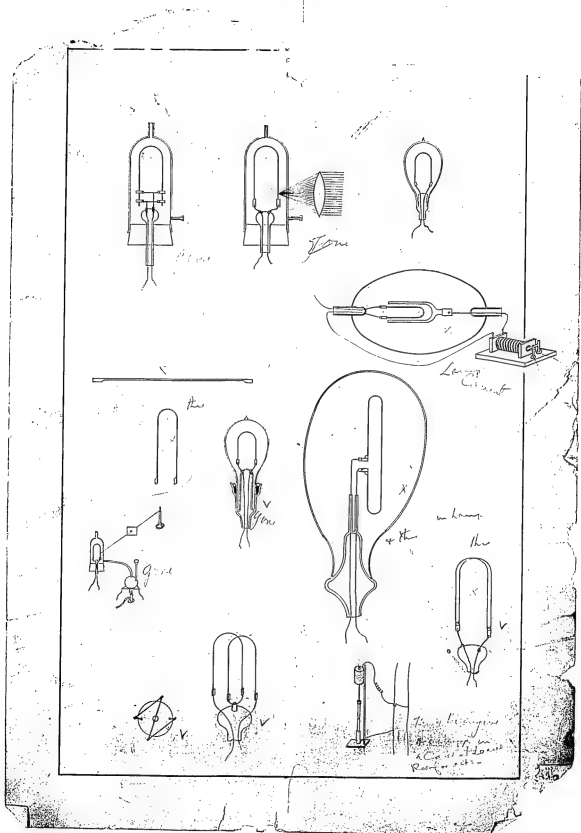
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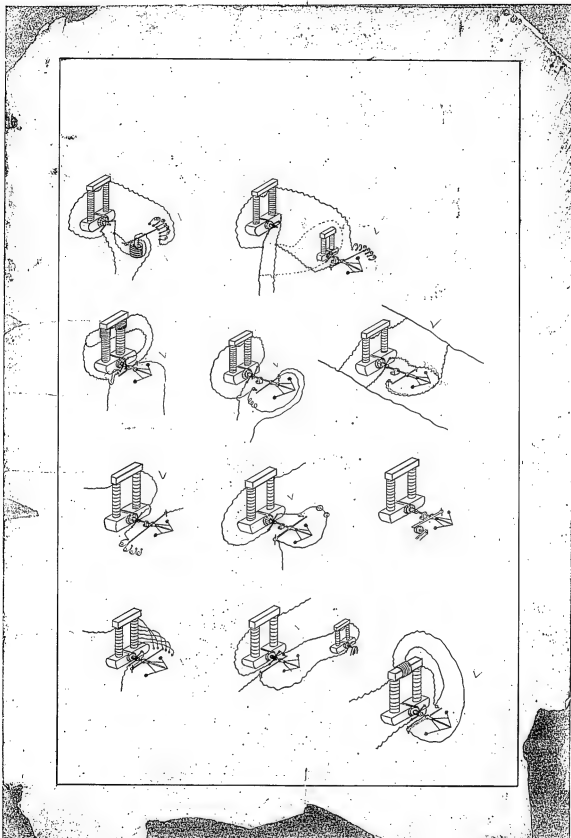
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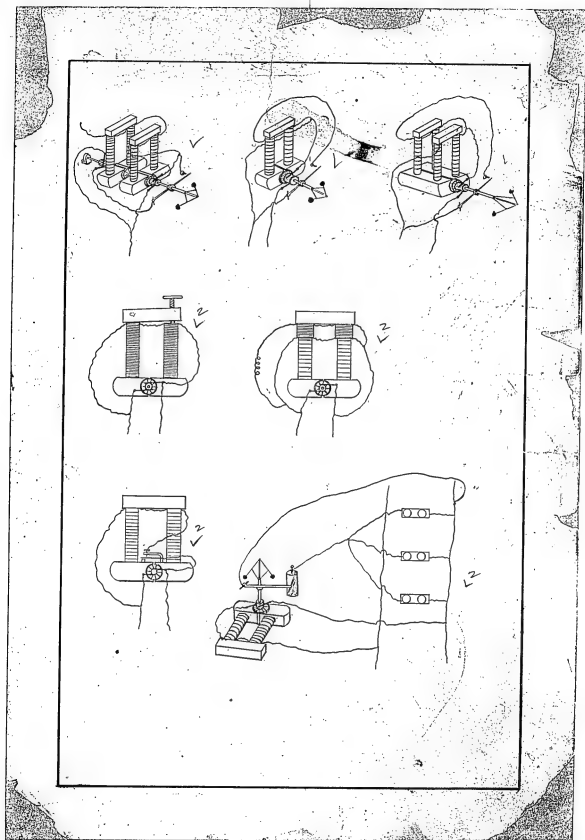




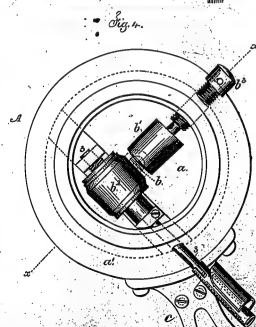
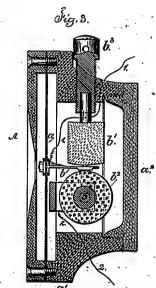
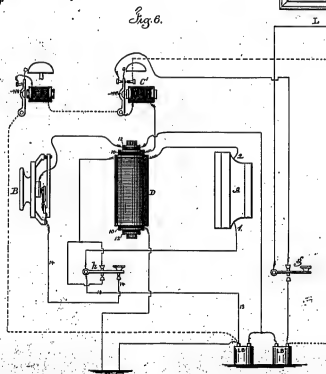
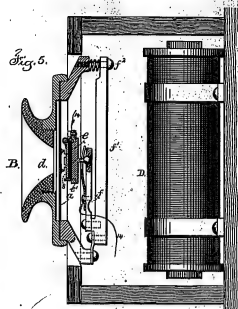
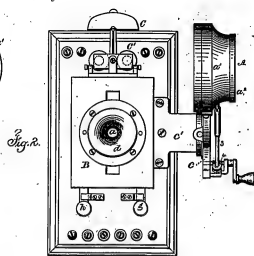
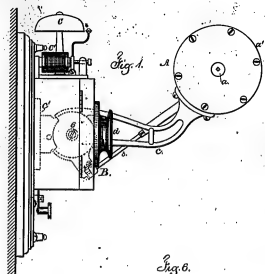
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Copy of drawings furnished the Victorian Electric Mfg. Co.
for Patents in Australia for Telephones.



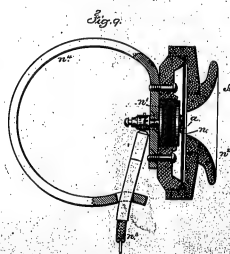
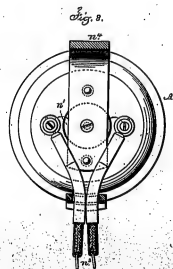
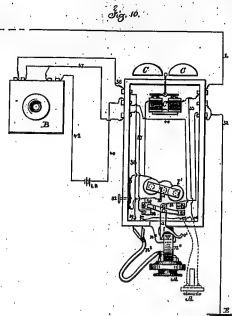
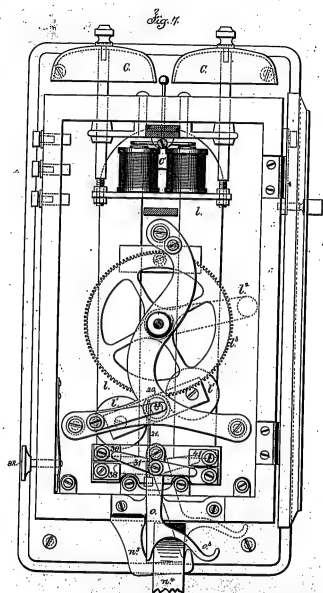


Fig. 11.

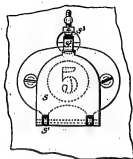


Fig. 12.

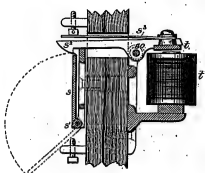


Fig. 13.

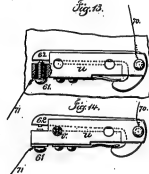


Fig. 14.

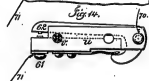


Fig. 15.

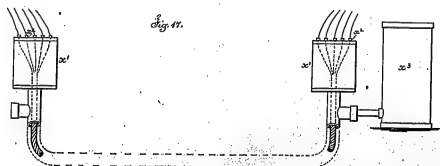


Fig. 16.

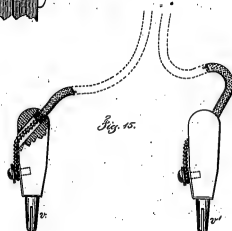
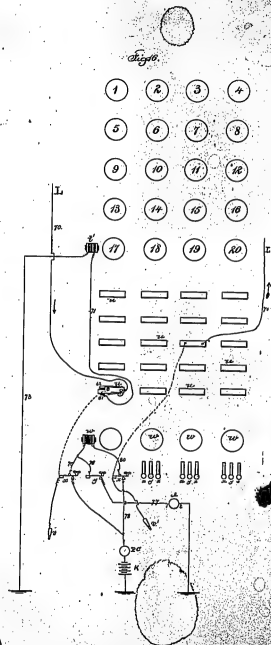
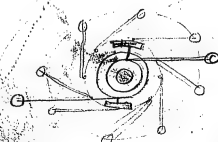
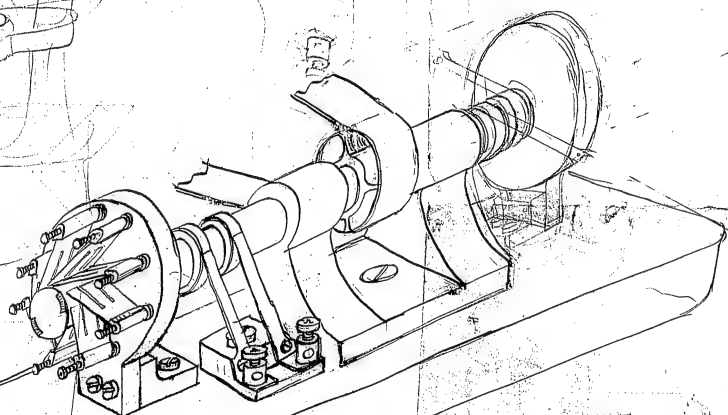
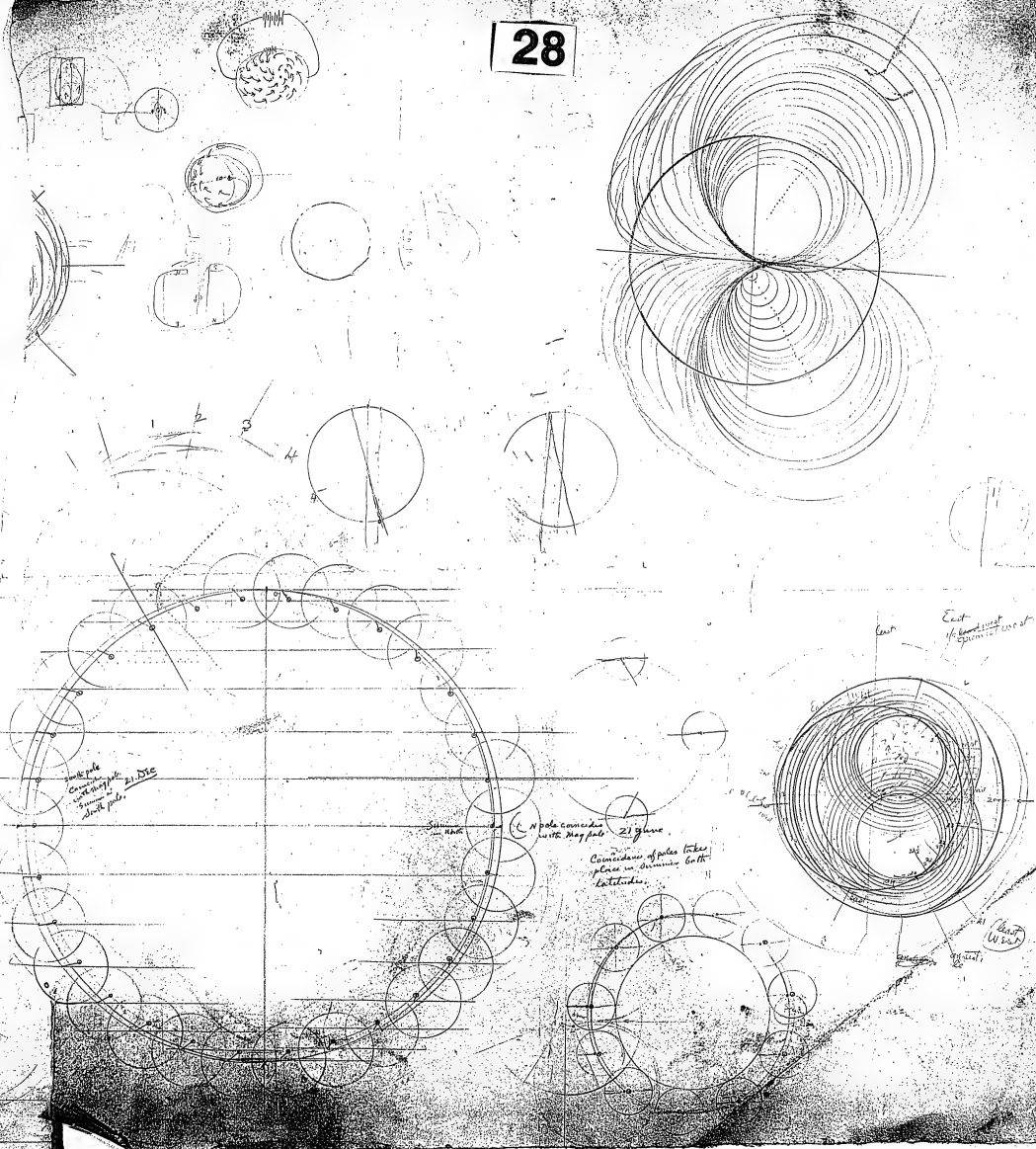
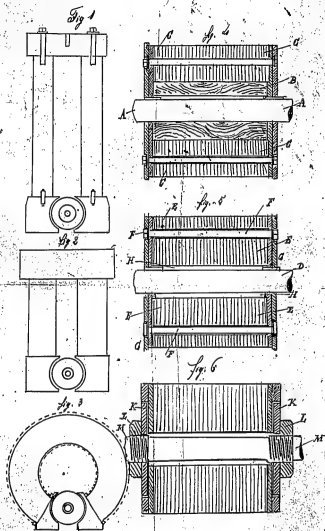


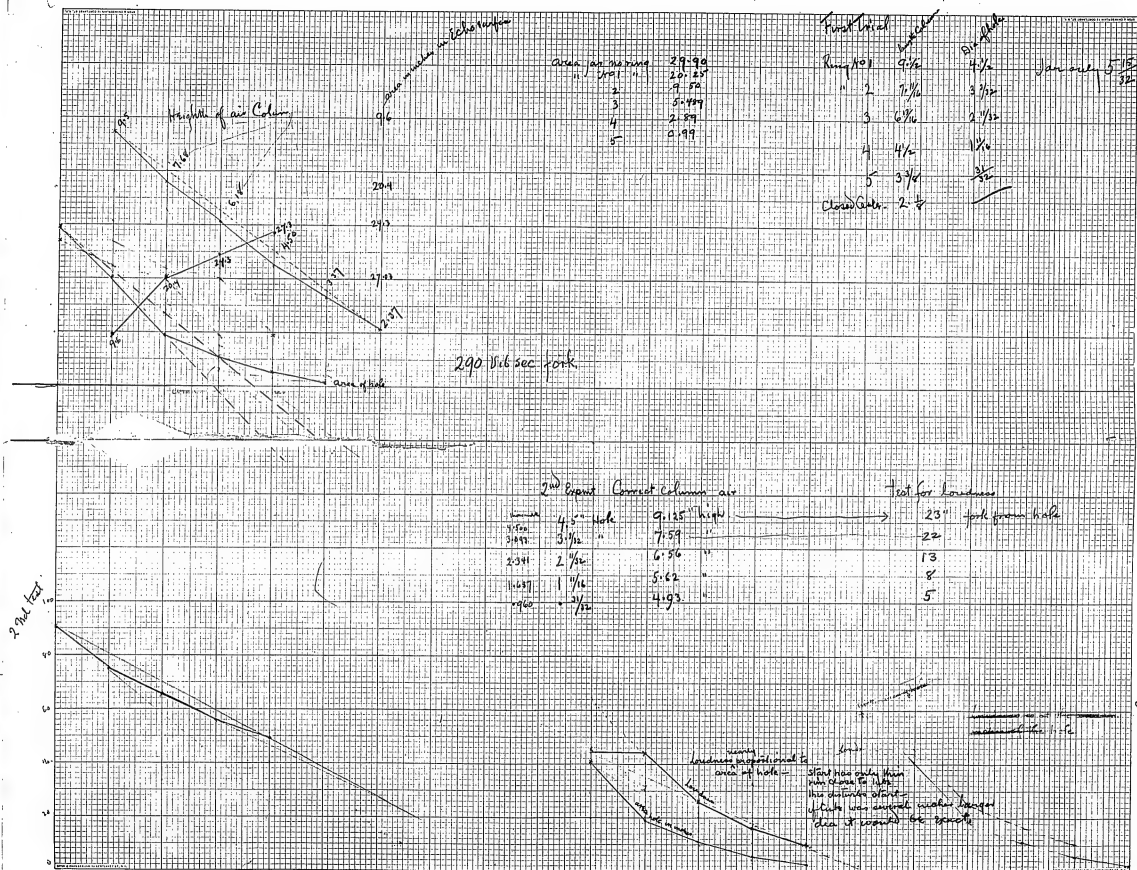
Fig. 17.











Electric Ckt.

Length of wire proportional to Emf.
Conductivity directly proportional to metal.
Doubling current 4 times the heat.
Doubling current twice magnetizing power.
Electricity produces heat in circuits continuously.

Closed circuit no difference Emf between any two points a matter except slight amount due to Res that foot.

passage E in circuit changes air between the circuit's opening.

Electricity passes through a liquid compound if interrupted in circuit.

Res of liquid 18 Billion times greater than the initial amount current depends on pressure.

Res of liquid conductors diminishes by heat.

Two ends dipping in the ocean will draw Res proportion to distance. But at great distance Res independent of distance.

heating metal of circuit diminishes amount current by raising resistance.

The two sides of the circuit repel each other.

~~Some~~ two separate circuits with battery in each of 1 unit Res gives each 44 foot lbs. repulsion. put in series - gives on the 2 ohm 88 - ~~as much~~. on double ~~unit~~ if in multiple are on $\frac{1}{2}$ ohm 88. but if on 2 ohm 22 - (10) is the proportion force.

Magnetic Ckt.

With magnetic arc

Doubling magnetism 4 times the cold

nothing being static

no diff magnetism

same

Passage of magnetic force will discharge it

Magnetism passes through both liquid & solids.

Not so high depends on pressure.

Res of same for thing increased by heat.

Res of an space very close directly as distance of great distance independent of distance.

Resistance to magnetism increased by heat.

Two sides of circuit attract

Circuit

Wiring

Strong Res - quick change.

High Res - slow discharge.

Two circuits inductive of change.

High Res same initial volts slow fall.

Two Condensers discharge three quantity.

same Emf of times slower change.

two in series times Emf $\frac{1}{2}$ quantity.

times as quick discharge.

Change time independent of

slightly better independent of

capacities

slightly better.

High Res - quick change.

Low Res - slow discharge.

Two circuits inductive of change.

Low Res - same initial volts slow fall.

Two in series times quantity.

Two in parallel times quantity.

Two in series times quantity.

Two in parallel times quantity.

Two in series times quantity.

Two in parallel times quantity.

Two in series times quantity.

Two in parallel times quantity.



Open circuit quick discharge.

If perfect conductor closed will hold charge.

The less the surface exposed & the greater the thickness the greater the change.

Change increases by greater distance.

discharge on low res circle of iron.

However Rapid the higher res must be.

Closed circuit quick discharge.

If perfectly insulated open will hold charge.

The greater the surface exposed & the less the thickness the greater the change.

Change increases with

close proximity

discharge on low Res

Circle of Condenser

Rapid bigger the circle

lower must be Res

Some of discharge at the square of the length of the magnetic wire with a given Res to discharge. Discharge also at the square of the Res $\frac{1}{2}$ the Res around core four times longer to discharge.

Electric Ckt

Electrically passing through wire wire increases its diameter & shortens its length.

The change in wire will later varies with each material.

The amount of E. storable in independent resistance is directly as to the surface of the wire & the resistance of changeable wire.

The resistance of a conductor ought to have a salivation which \rightarrow vary with each kind.

Resistance \rightarrow conductivity.

The changing resistance of a long Electric Ckt is infinitely greater if away from matter. Passes means resistance to E of changeable matter.

But with a given size wire in circuit the changing & discharging time is close proximity to changeable wire conductivity varies at the square of the distance.

Conduction of E. through wires changes its flow & quickly.

The smaller the amount of changeable matter between the parallel wires of the circuit & the greater the surface of the wire the greater the change storable.

The Capacity of changeable matter should increase by heat & be lost at intense cold.

Conduction of E. through compound liquids should decrease by heat, in proportion to the size it bears to the whole circuit.

Magnetic Ckt

Magnetism passing through an iron wire decreases its diameter & increases its length.

The magnetism passes metals will also varies with each metal.

The amount of E. storable in circuit is directly as to the small wire. The smaller the wire the greater the resistance to the circuit & the amount of E. storable in circuit. The amount of E. storable in circuit is directly as to the small wire. The smaller the wire the greater the resistance to the circuit & the amount of E. storable in circuit.

From soon becomes saturated & constant metal also vary in this point.

also.

The changing time of a magnetic circuit of a length of wire is infinitely greater if away from changeable matter. Passes means resistance to magnetism of changeable matter.

But with a given size wire in circuit the changing & discharging time is close proximity to changeable matter conductivity varies at the square of the distance.

The greater the unchangeable surface between the two parallel sides of the magnetic circuit & the smaller the surface the greater the change storable.

The Capacity of store in wire should decrease by heat & increase by intense cold.

Conduction of mag through a compound solid or liquid should decrease by heat, in proportion to the size it bears to the whole circuit.

Electric Ckt

A great deal of energy can be (transformed) with little heat in the conductor.

Heat is as the square of the current.

When the internal Res of a wire is equal to external maximum current available outside.

A static device may be changed from ends of circuit to conductors.

If a device have plates separated it will hold charge indefinitely.

If poles closed change of heat & matter is free.

A sound is heard when changing & discharging the conductors.

1. Cell gives one pressure
2. Cells two pressure.

2. Cells will overcome twice the space in length.

Changing matter between wires circuit quantity or work stored is in proportion to surface & thickness of matter.

Rapidity of discharge at the square of the thickness.

E. passing through heated wire heats it more.

Magnetic Ckt.

A great deal of energy can be stored up with little loss in the wire.

When the Res of Magnetic circuit is equal to air space maximum magnetic or greater length of air space permissible.

A static permanent magnet may be changed from magnetic area.

If a device may have poles closed it will hold charge indefinitely.

If poles open doesn't go off, but probably would if whole of solid was glass had a piece off - the soft part probably acts as a keeper by induction through air space, a sound is heard when changing & discharging a magnet.

1. magnet gives 1 magnetic pressure
2. " " 2 " "

2. magnets in series will overcome twice the air space.

Changing wire by wire work stored is in proportion to area of surface & thickness of matter.

Rapidity of discharge at the square of the thickness.

Magnetism passing through heated magnetic circuit heats it more.

Heat.

Expands matter through which it
passes.

Heat stays longest in large
wire & longer as it is poorer conductor
& greater capacity for heat.

Electricity

Electricity should expand
lengthwise & contract it short.

Electricity disappears as
you conduct away matter.

Magnetism

ditto,

Magnetism stays longer
in large wire as it is a
better conductor & greater
capacity for magnetism.

Electrolysis

Chargeable matter sets itself axially
between ends of circuit -
+ unchargeable matter equatorially

anything attributable by poles of
E circuit

An Electric Condenser has
superficial charges -

on plates it should be solid conductors
if the medium between is not solid it should be
non-conducting -
Effectively can be insulated
by a perfect non conductor -

nothing found in solid circuit good or better than in air circuit

Conducting water cannot
be charged by E

The best chargeable compound
for E -

Condenser The better the insulator of Condenser
the larger the holding on charge is retained

The amount of E stored in
chargeable matter depends
on the EMF of E independent
of quantity -

Chargeable matter source depends on EMF of
E

If there is no saturation
for a dielectric - this probably
is but this can be made greater
by doubling the amount but
not

Electricity can only pass
through bodies insulators
where they are ligured

Electricity Causes decomposition
of compounds through coil
it passes

If passage of E through
a liquid produces heat

If heat going from a hot to
a cold junction produces E

Magnetics

Magnetic bodies with
plates chargeable matter should set
itself equatorially between magnetic
poles + magnetic bodies with axially
+ electric markings etc. matter indifferently
should be repelled by magnetic axis
+ vice versa -

Magnets should have same
magnetic to broken up for iron

if magnetic bodies broken up into small pieces with magnetic
poles they will attract each other (magnetic bodies broken up)
this is true even if they are not touching
by a perfect conductor -

Conducting water cannot charge
M -

should be the bond of M

The amount of stored E ...
depends on the amount of
independent of EMF -
charge may depend on amount + independent
of EMF

There should be more for
magnetic iron

This is for iron but you can double
the amount

Magnetism that passes through
solids can not pass through where
it is ligured -

Hence Magnetism should
produce combination in
liquids or solids which it
can pass

passage of magnetism through
a liquid should produce heat
the magnetism going from a cold
to hot junction should produce
E

Then making fine bundles of dielectric
should lengthen the discharge in an
Condenser; now insulated from conductors.

Notes -

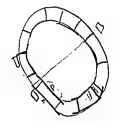
If field many of Dyrans (condensers)
with no break in unbroken field pieces
+ all with solid Copper say 4 inches
thick it will be charged up to saturation
gradually by the armature assembly
that way without any external energy
+ the Volt will fall with the load
it can be regulated by opening
the Copper or Copper bonding
probably you know in charging -

If we double the length of the
Copper vs. Res have 4 times the
an open after the Res which
where Res should equal the
magnet

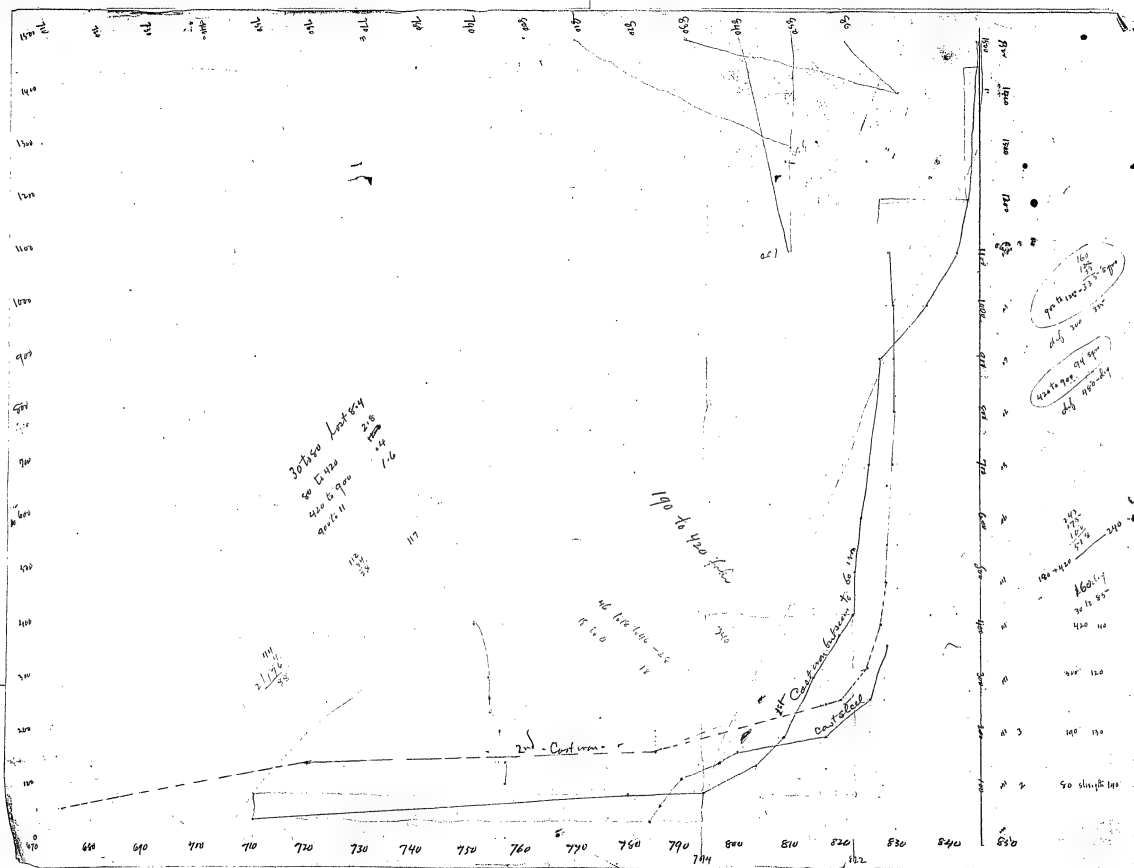
The small the Source of E Res
against the order the greater the
Energy available

If making magnetic circuit of iron
fine wires to produce the discharge
insulated from each other

The double the Source of E Res
lowers the order or an Res that
quadrates the available E of power

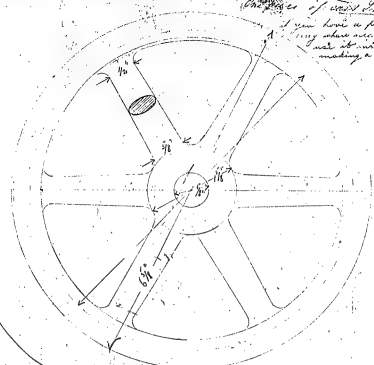
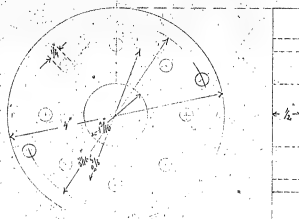


10 cards each		5 cards each	
Σ	m	Σ	Σ
680	420	290	260
530	570	310	240
490	480	230	320
530	570	260	280
450	650	240	240
610	500	310	240
570	550	290	260
540	560	220	330
390	770	340	210
540	560	240	310
540	560	240	310
610	490	310	240
6450	4670	3300	3500
10 cards 8 highest & 10 lowest:		5 cards 8 highest & 5 lowest:	
470	630	1320	880
670	430	950	1250
660	440	2270	2130
460	640	2270	2270
510	590	440	1260
620	480	1240	990
460	640	1140	1060
610	480	2350	2050
390	710	2350	2050
700	400	40	300
550	550	2270	2270
6720	6480	40	300
10 cards 8 highest & 10 lowest:		5 cards 8 highest & 5 lowest:	
470	630	1320	880
670	430	950	1250
660	440	2270	2130
460	640	2270	2270
510	590	440	1260
620	480	1240	990
460	640	1140	1060
610	480	2350	2050
390	710	2350	2050
700	400	40	300
550	550	2270	2270
6720	6480	40	300



Electric Hummer
Battery

one piece of steel



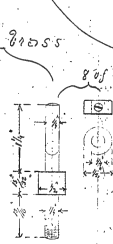
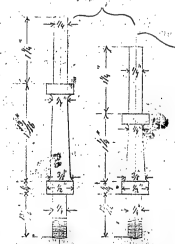
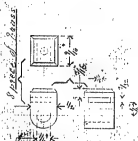
one piece of brass
if you have a fully
working motor, the
last of the work
making a piston

one of each

brass

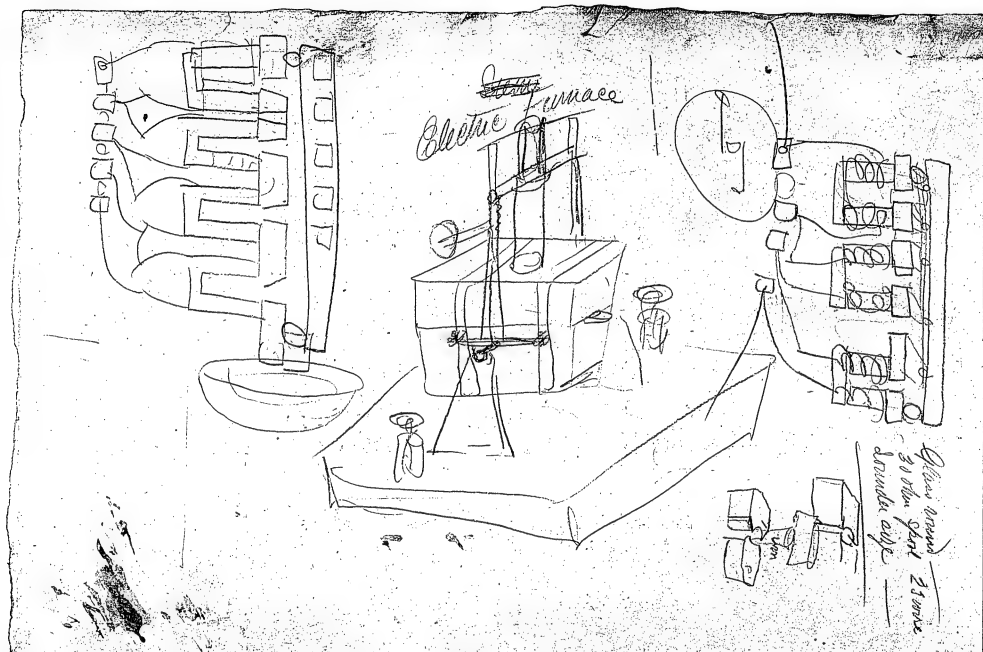
2 of each

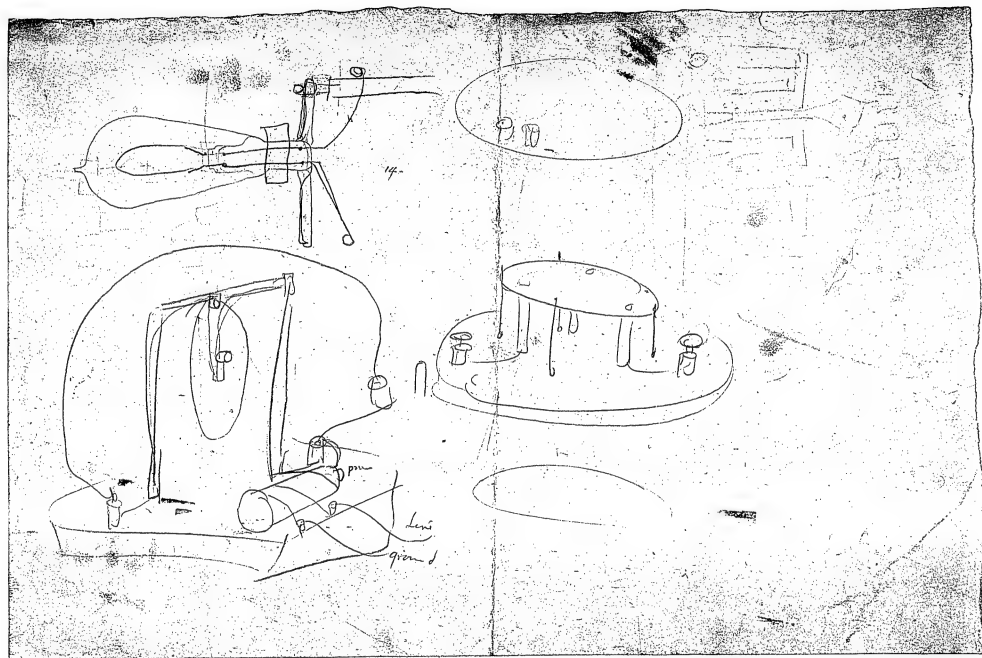
finish over all

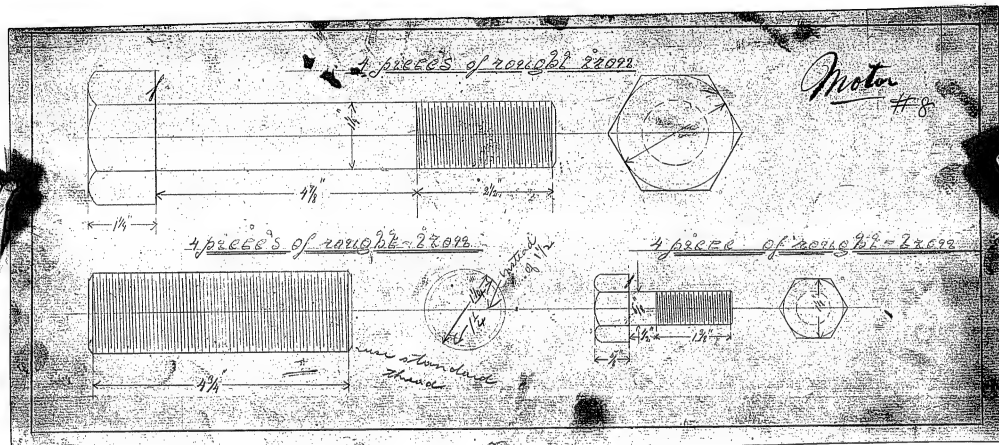


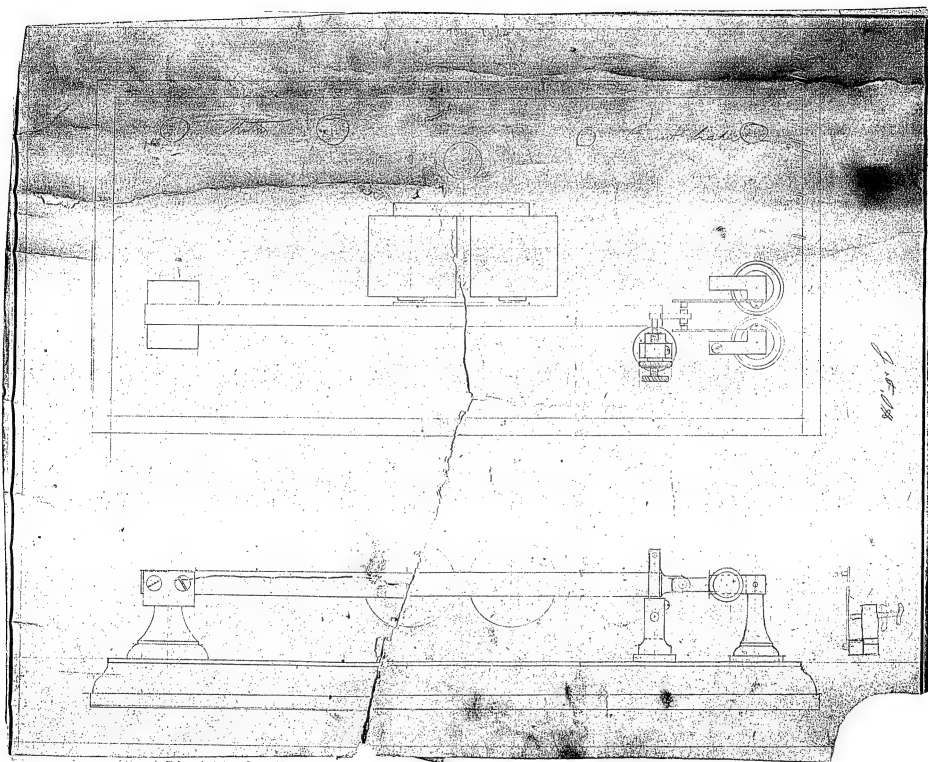
one piece of each





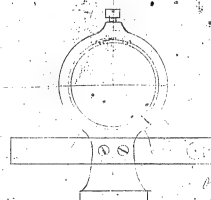
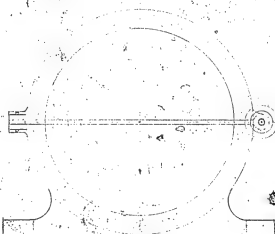
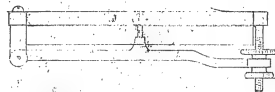
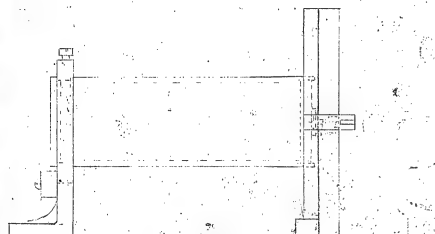




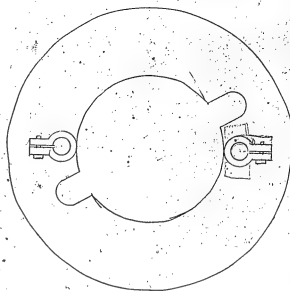
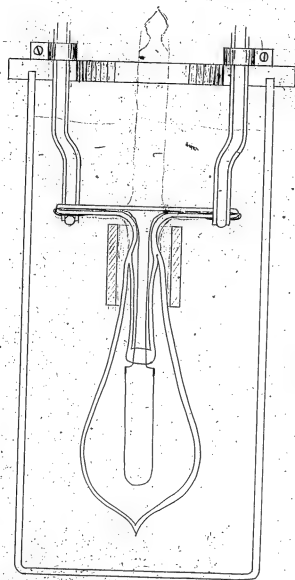


Make Guss of this

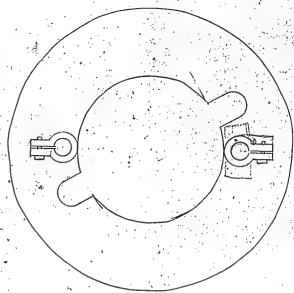
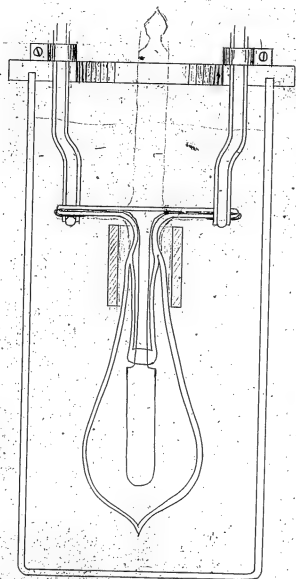
LABORATORY OF
T. A. EDISON,
285 AVENUE B, cor. 17th St.



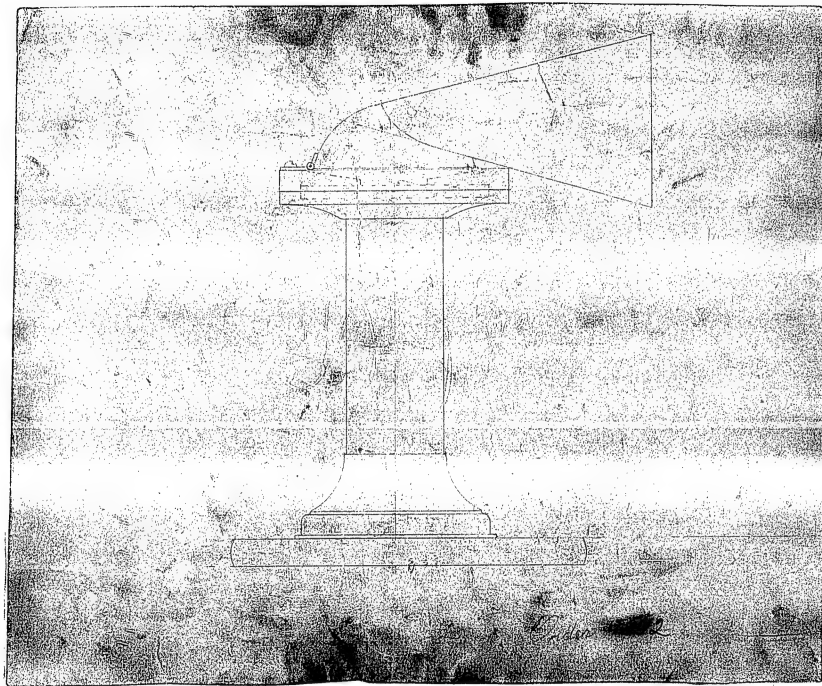
*Amie
C. 100
The instrument
let & building
me 4.*

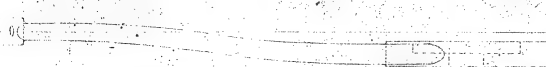


*Mining Lamp
Full Size*



*Mining Lamp
Full Size*



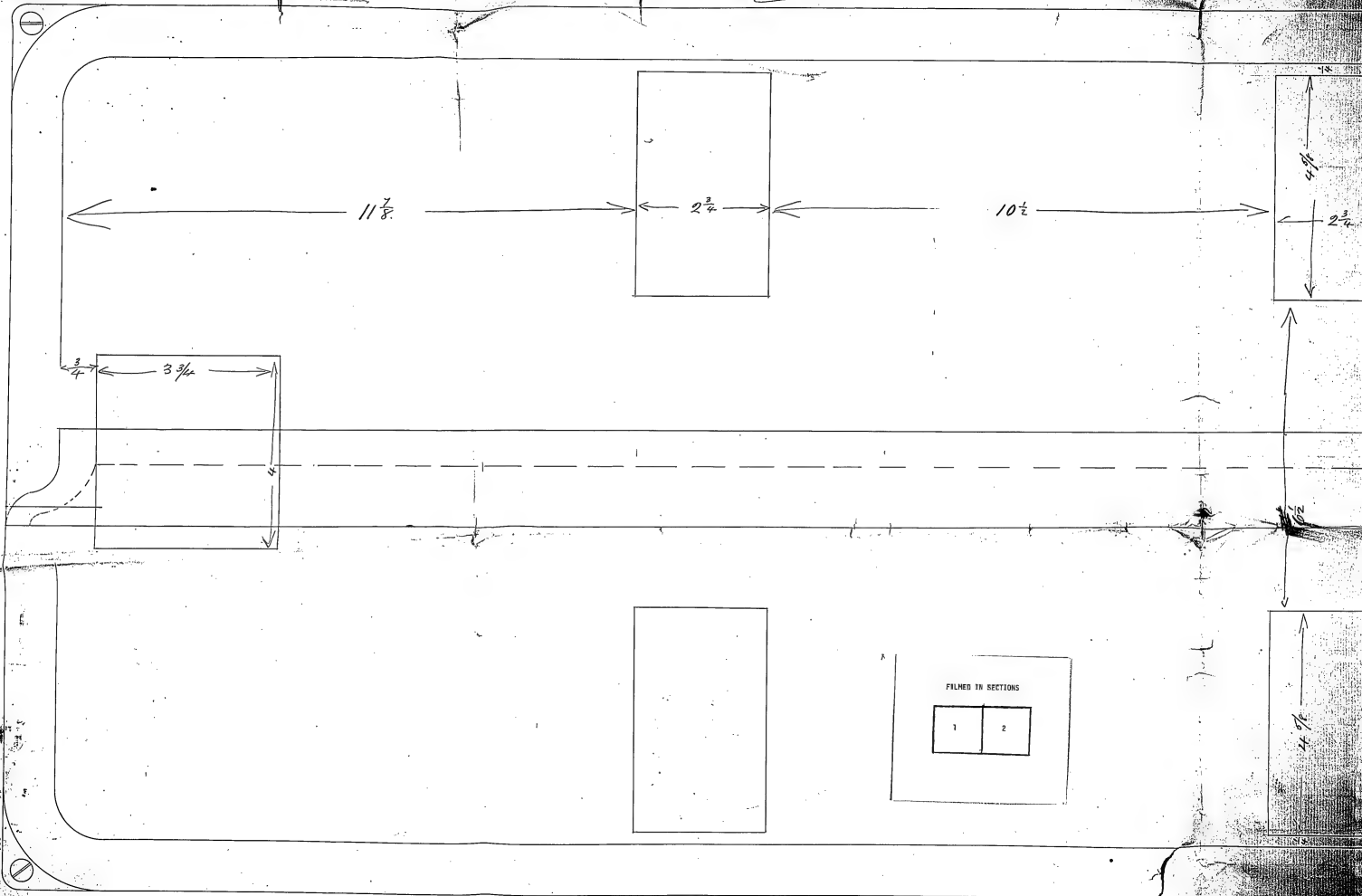


MENLO PARK MACHINE SHOP DRAWINGS, 1879-1880
(Reduction Ratio = 18:1)

Edwards Magnesium Machine

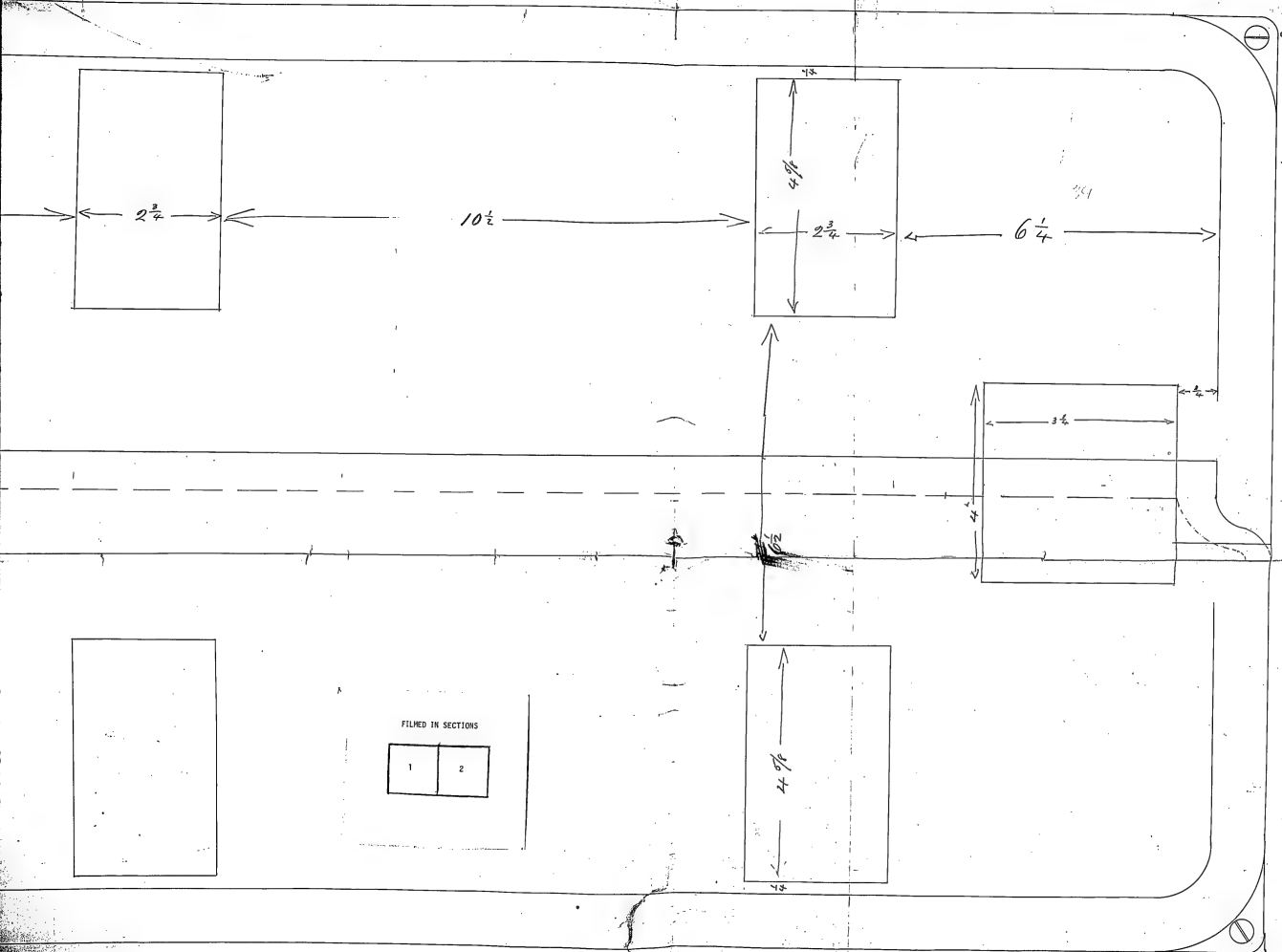
Jan 6 1919

Chas. B. Batcher



Jan 6 1919

Robert B. B. B.



$11\frac{7}{8}$
 $10\frac{4}{8}$
 $2\frac{6}{8}$
 $6\frac{1}{8}$
 $34\frac{1}{8}$

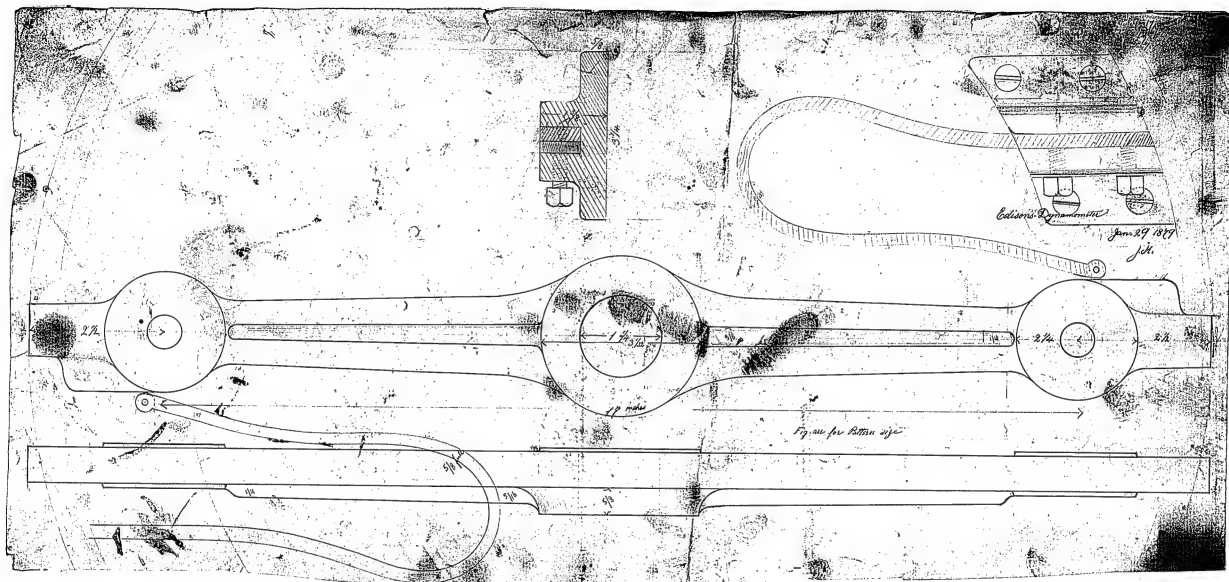
20
 $2\frac{1}{2} \times 1\frac{1}{2}$

1 2

$2\frac{3}{8}$
 $2\frac{3}{8}$
 $4\frac{1}{8}$
 $9\frac{2}{8}$

$92 =$
 132
 184
 276
 279.44





Dial outside $5\frac{1}{16} = 5.5625$

Thickness Dial of Shell = $5\frac{1}{16} = 5.5625$

No. of Divisions 106

$$\begin{array}{r}
 5.562 \\
 31416 \\
 \hline
 33372 \\
 5562 \\
 222482 \\
 5562 \\
 \hline
 16686 \\
 106 \overline{) 17373579} \quad 164 \\
 \underline{06} \\
 677 \\
 \underline{666} \\
 113 \\
 \underline{1124}
 \end{array}$$

1060

Edwin 89

Thickness of 4 pieces of wire = 1.36 Thickness of Center
 Thickness of partition = 0.20
 Depth of groove = 0.60

$$\begin{array}{r}
 136 \\
 020 \\
 \hline
 156
 \end{array}$$

$$\begin{array}{r}
 34 \\
 136 \\
 \hline
 170
 \end{array}$$

$$\begin{array}{r}
 164 \\
 106 \\
 \hline
 584 \\
 164 \\
 \hline
 748 \\
 32 \\
 \hline
 780
 \end{array}$$

$$\begin{array}{r}
 1.64 \\
 5.56 \\
 314 \\
 \hline
 2.24 \\
 1656 \\
 106 \overline{) 174504} \quad 164 \\
 \underline{06} \\
 636 \\
 \underline{636} \\
 490
 \end{array}$$

$$\begin{array}{r}
 164 \\
 106 \\
 \hline
 584 \\
 164 \\
 \hline
 748 \\
 32 \\
 \hline
 780
 \end{array}$$

No. 50

March 6th 1849

J. A.

Carbon Shipping Apparatus

12 carbon 1.00 thick
13 carbon = .52. 2m
1.60 inside length

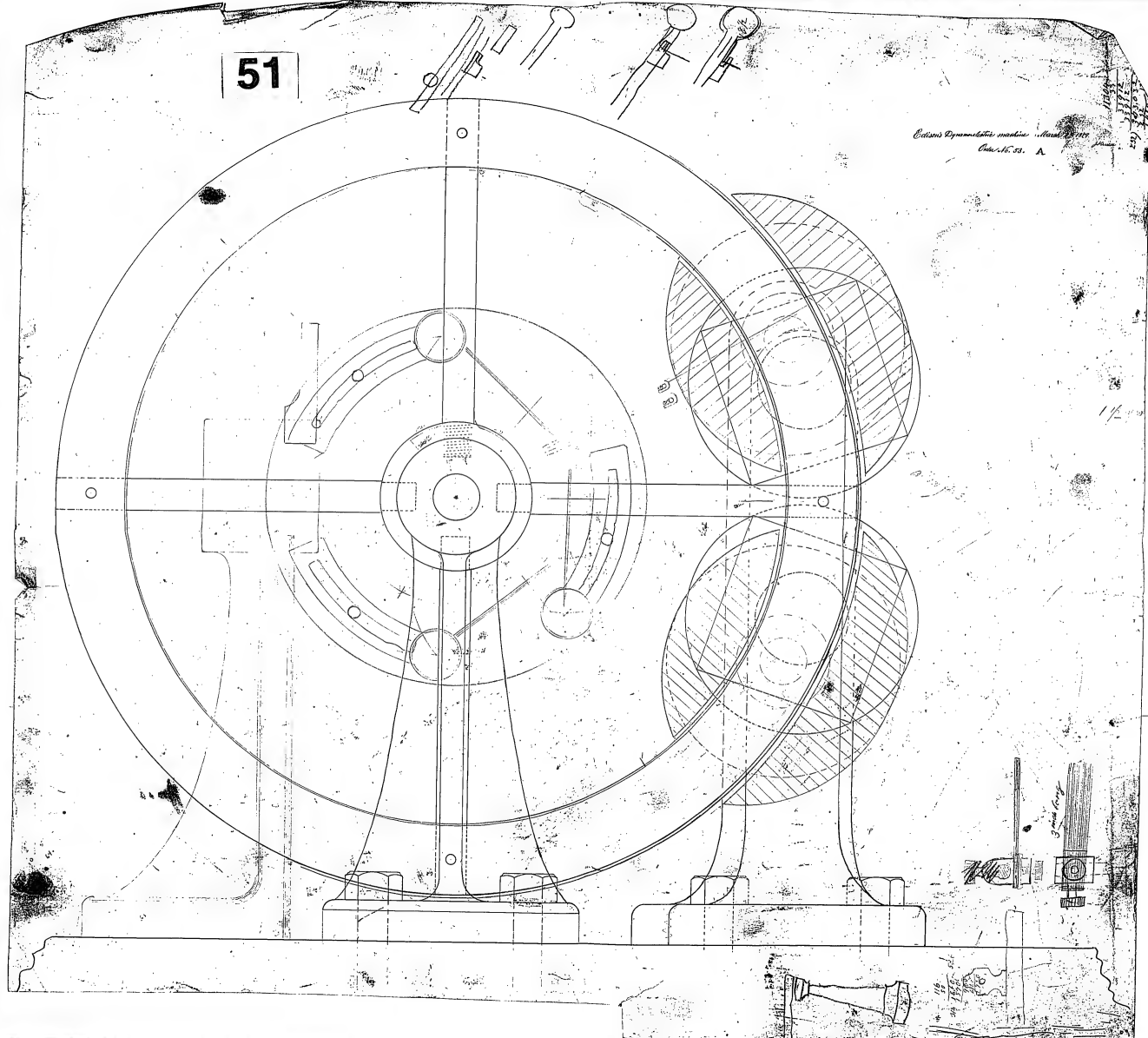


The Cornice
Chalksatcher
M. M. For
Grop Elakem

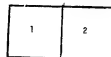
For

51

*Edison Dynamometer machine - Serial 1000
March 15, 1881. A.*



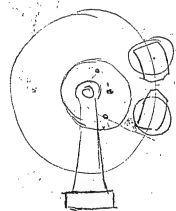
FILMED IN SECTIONS



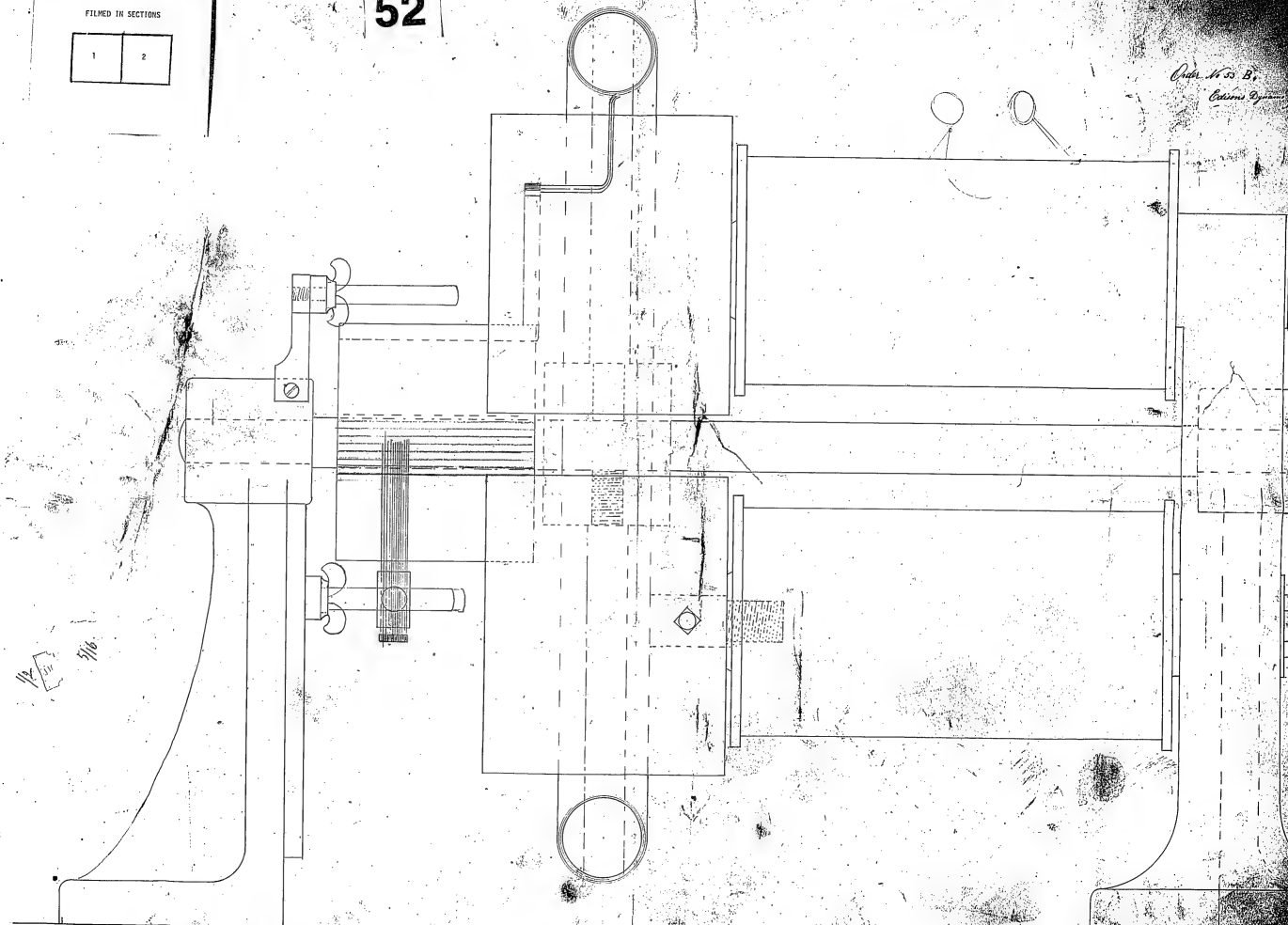
52

52 x 324

Path. No. 52 B.
Camera Type



1/4
5/16



FILMED IN SECTIONS

1

2

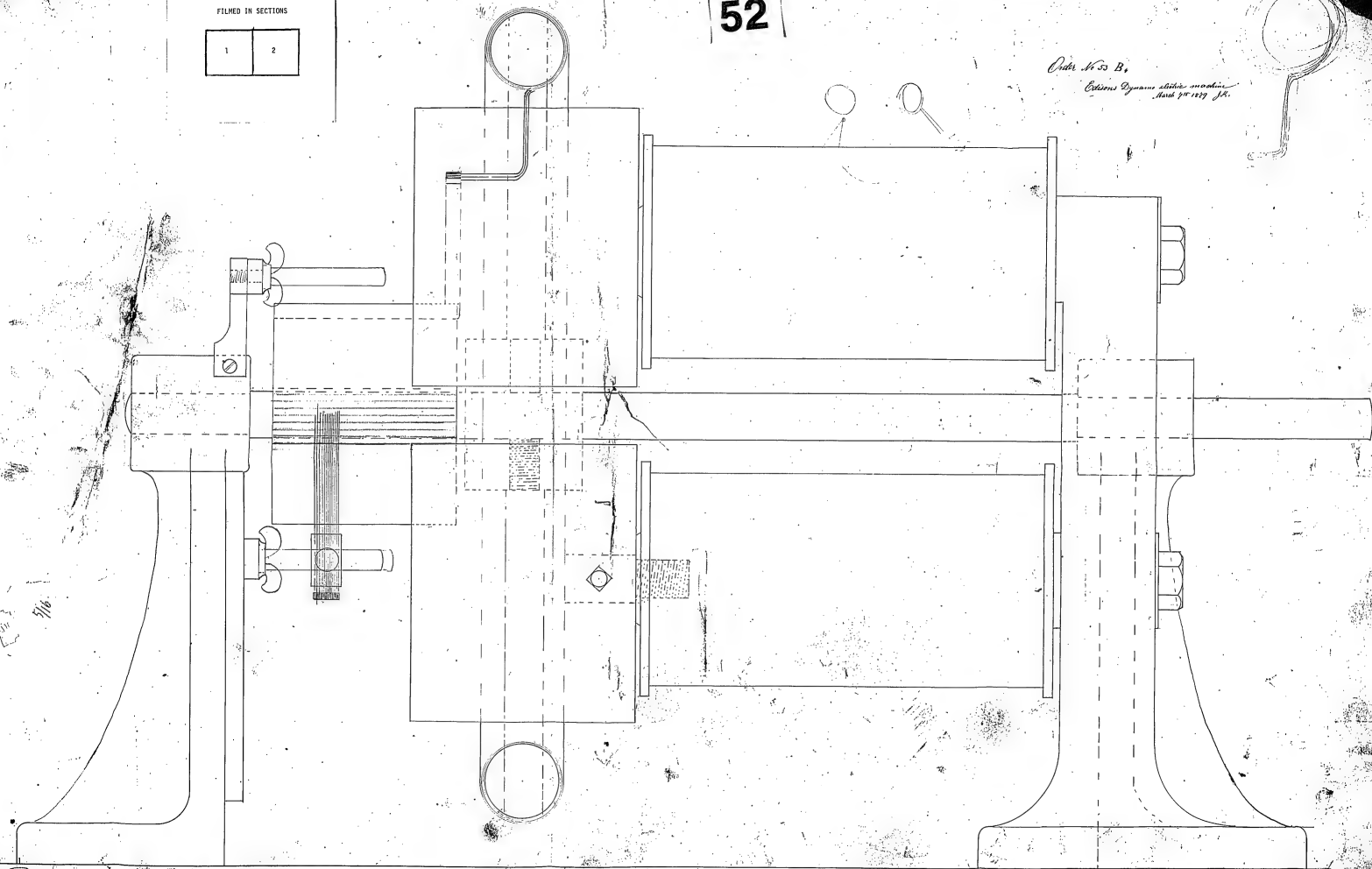
52

2 1/2 x 3 1/4

Order No. B.

Extreme Dynamic static condition
April 19 1939 J.R.

1/2
3/16



1	2
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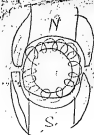
52



52

FILED IN SECTIONS

1	2
---	---



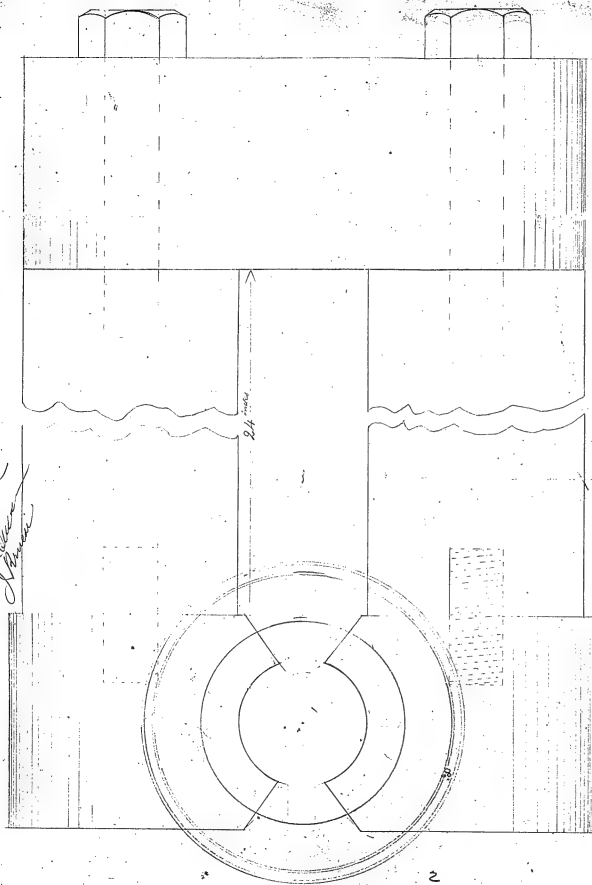
-167
501

341
312
1364
1028
21104.074.5

14.135
3135
42375
A) 44,56059-110885
689
26/11/2011 12.11
46

(12/12/2006)

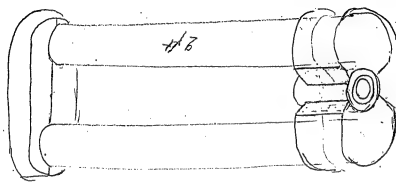
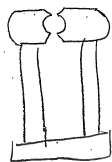
W. H. Good
W. H. Good
W. H. Good



Calver's Dynamo machine
March 13th 1877

24 inches

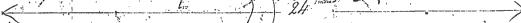
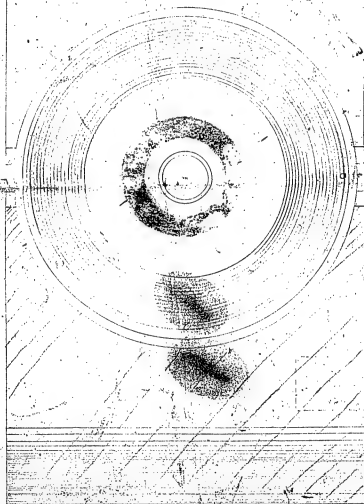
6 1/2 ft long
24 inches 6 1/2 ft long

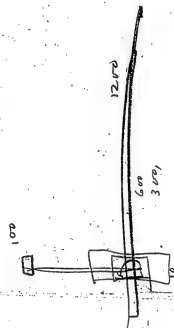
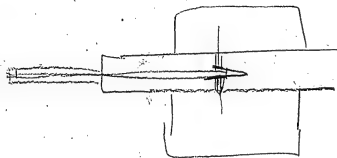


March 29
(Mar. 23, 1917)

March 29, 1917

Edison's Tascote machine
March 13th 1879
J.M.





10' March

1200

600

20

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

40

3

$$\begin{array}{r}
 188 \\
 1188 \\
 1203 \\
 \hline
 19/1880 \quad 592 \\
 1188 \\
 \hline
 700
 \end{array}$$

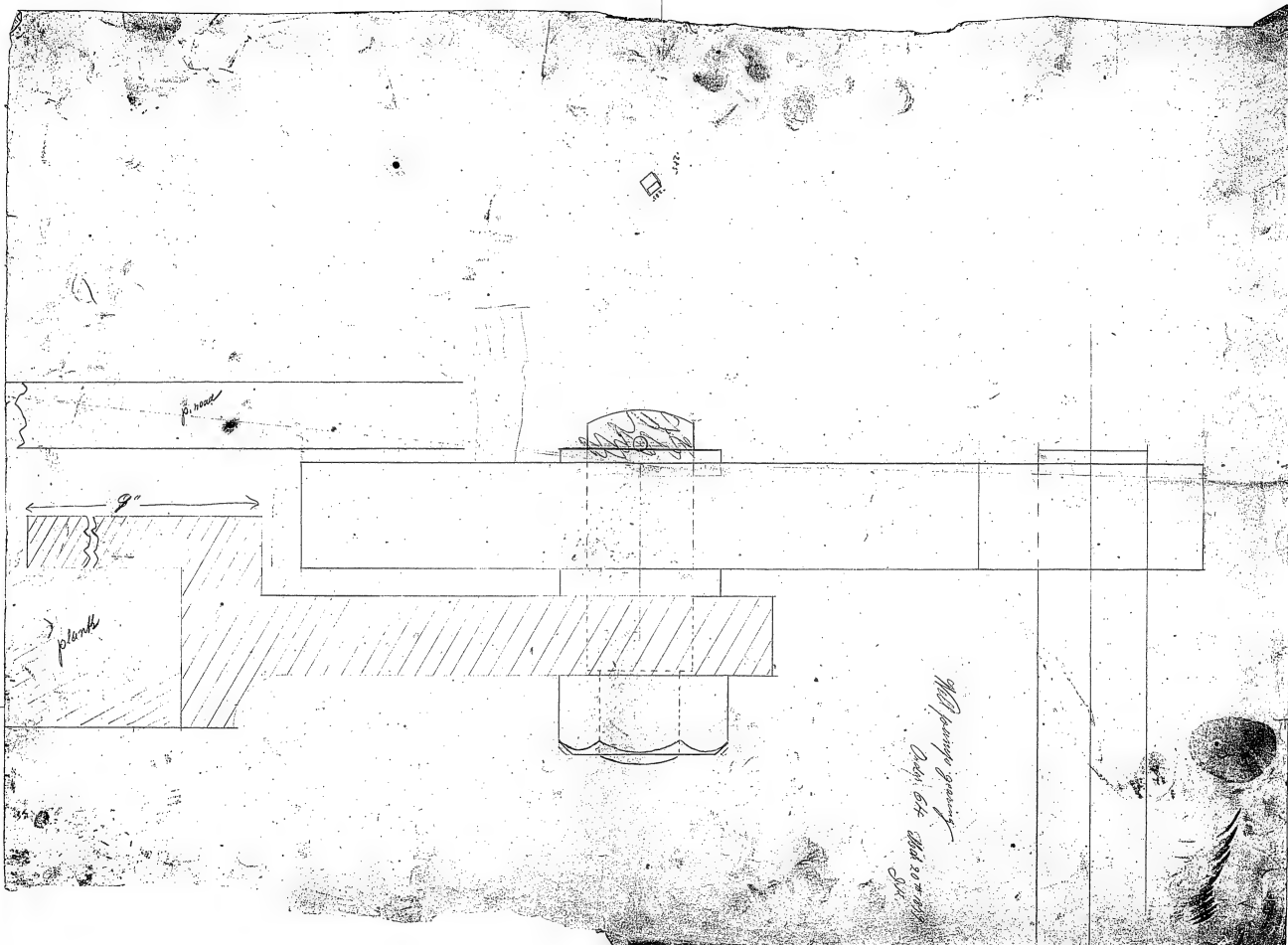
$$\begin{array}{r}
 188 \\
 1188 \\
 1203 \\
 \hline
 12/1880 \quad 592 \\
 1188 \\
 \hline
 700
 \end{array}$$

$$\begin{array}{r}
 188 \\
 1188 \\
 1203 \\
 \hline
 20/1880 \quad 592 \\
 1188 \\
 \hline
 700
 \end{array}$$

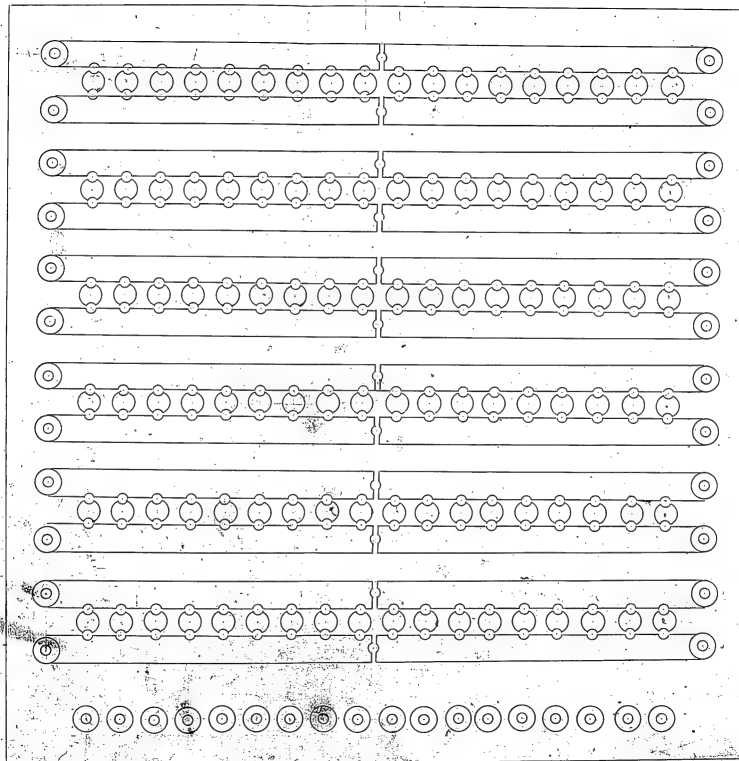
$$\begin{array}{r}
 188 \\
 1188 \\
 1203 \\
 \hline
 19/1880 \quad 592 \\
 1188 \\
 \hline
 700
 \end{array}$$

$$\begin{array}{r}
 188 \\
 1188 \\
 1203 \\
 \hline
 10/1880 \quad 592 \\
 1188 \\
 \hline
 700
 \end{array}$$

$$\begin{array}{r}
 188 \\
 1188 \\
 1203 \\
 \hline
 60-19-20-10
 \end{array}$$

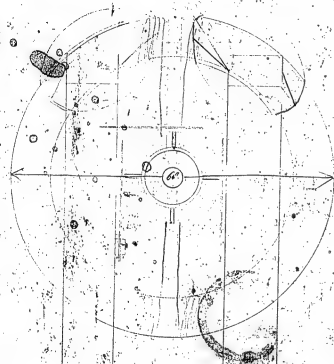


14. April 1919



McLennan
111-11-11
Jensen



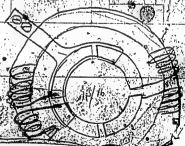
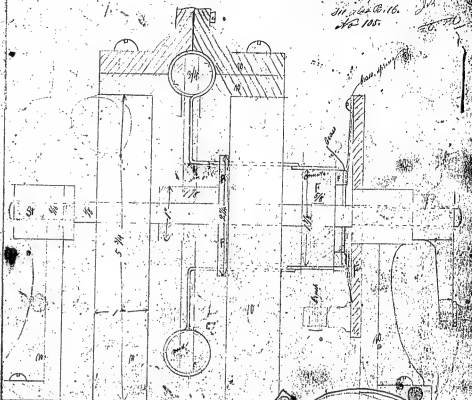


25 ends
10 turns

2/6

25 ends
10 turns

Colgate's Electric Machine
Patented Jan 1889
In 1888, 1889, 1890
No. 115.



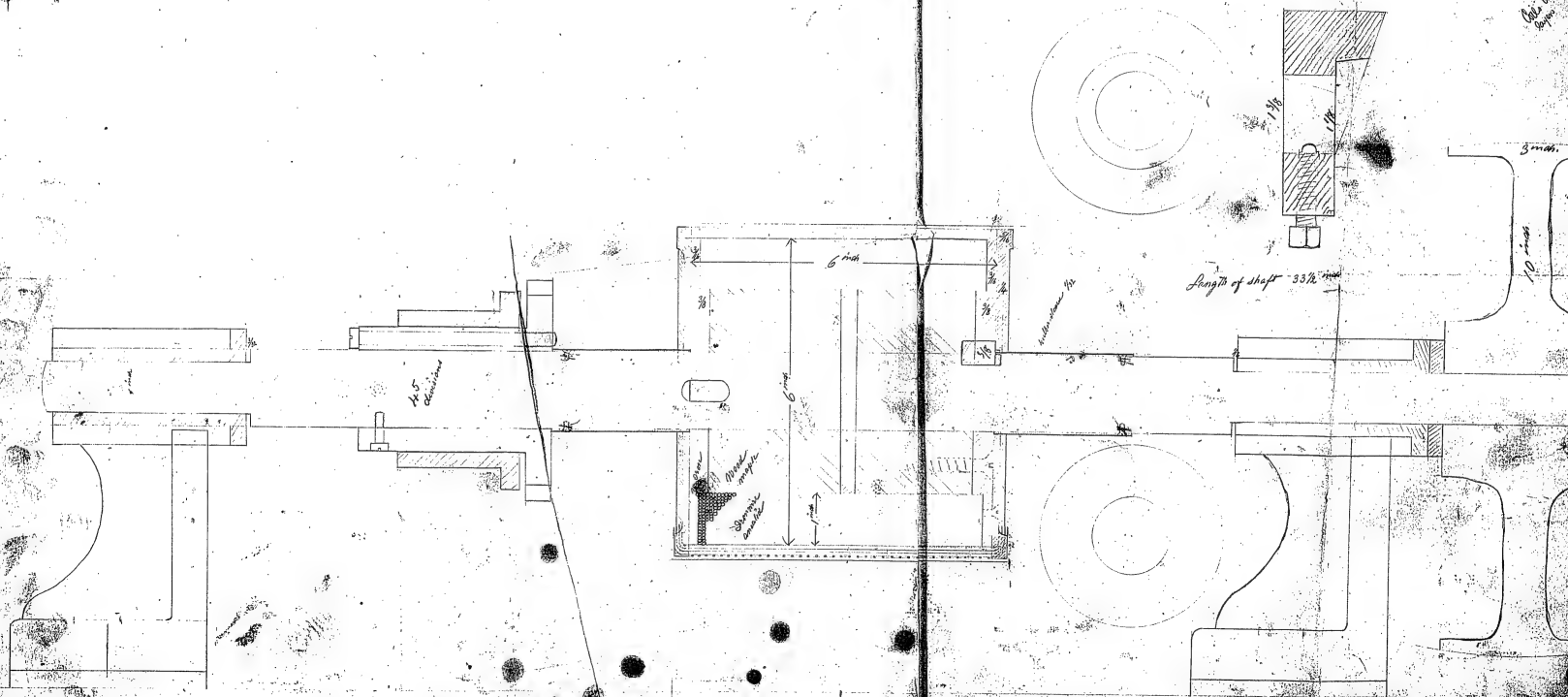
1	2
---	---

59

45 Poles at 3 layers with 3 turns No 18 cotton cord wire = .056
of dimensions

Edison

Cal. Women
Prayers



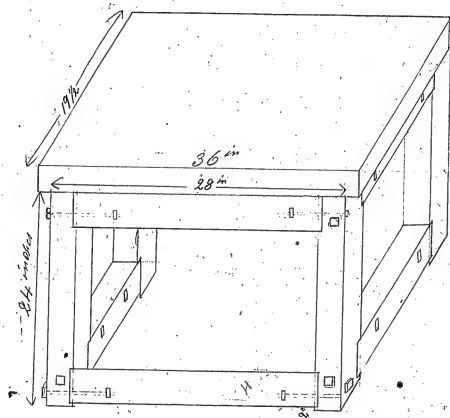
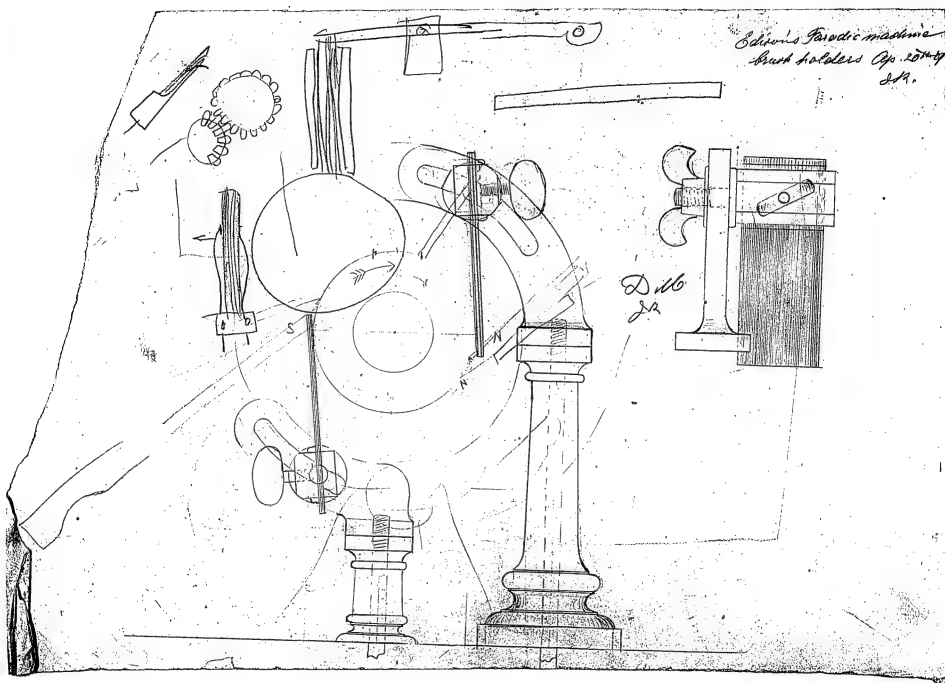
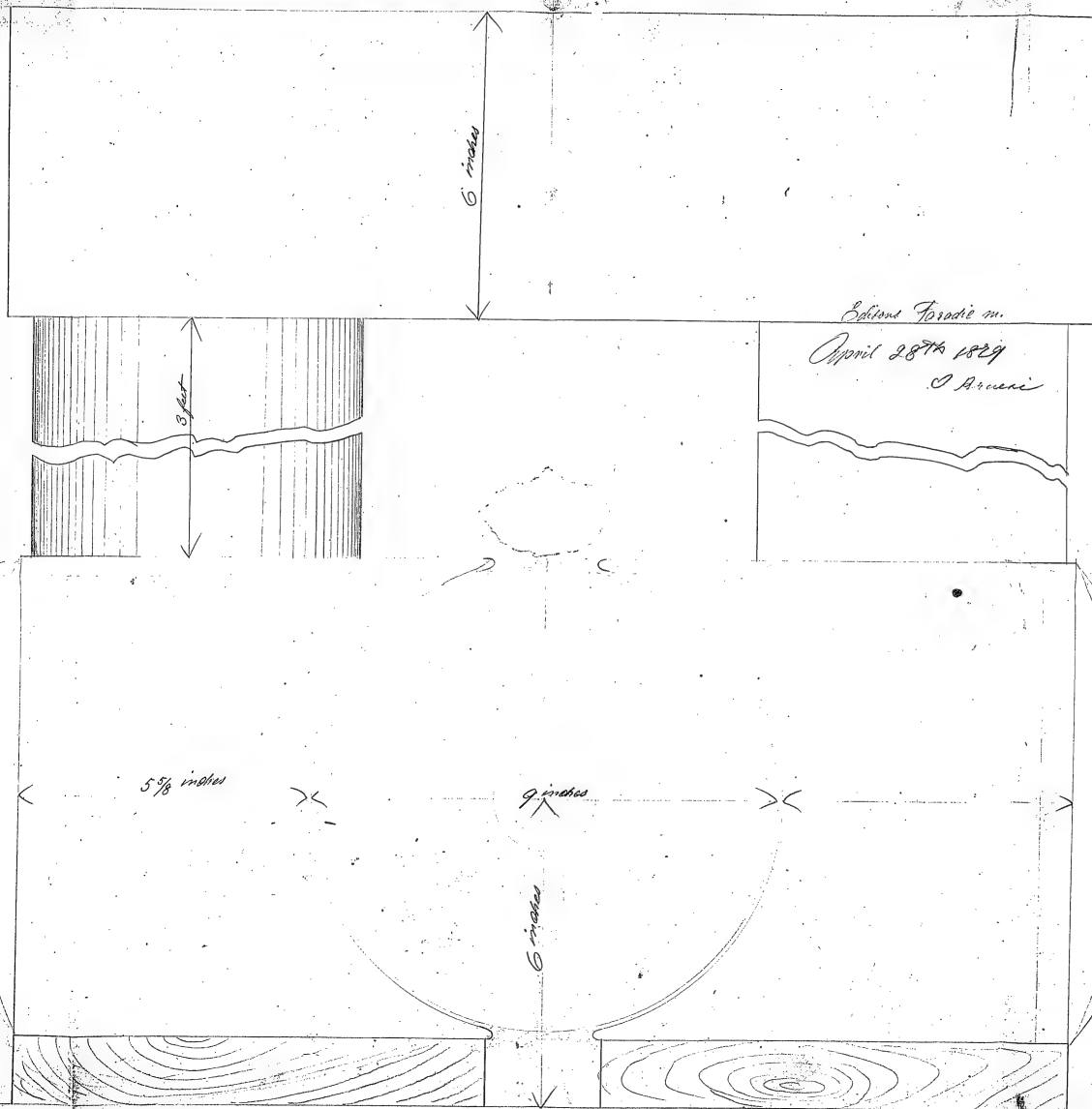


Table for Edison
Paradic machine
improved #1658.
April 20th 1899
J. H. M. M.



62



Handwritten calculations:

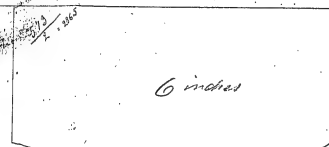
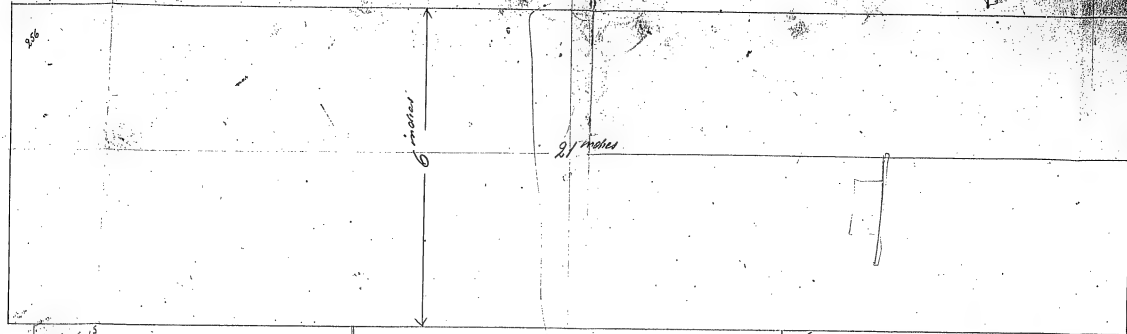
$$\begin{array}{r} 8 \frac{1}{2} \text{ ft} \\ 3 \frac{1}{2} \text{ ft} \\ \hline 12 \text{ ft} \end{array}$$

$$\begin{array}{r} 9 \frac{1}{2} \text{ ft} \\ 3 \frac{1}{2} \text{ ft} \\ \hline 13 \text{ ft} \end{array}$$

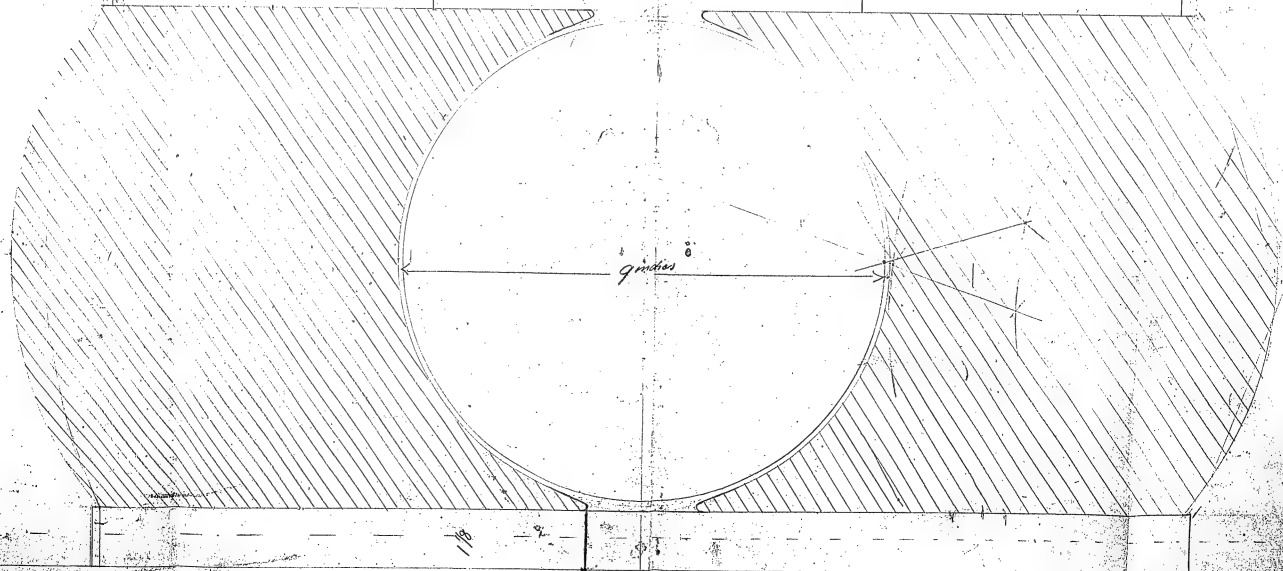
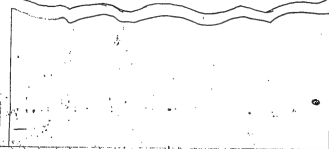
$$\begin{array}{r} 10 \text{ ft} \\ 3 \frac{1}{2} \text{ ft} \\ \hline 13 \frac{1}{2} \text{ ft} \end{array}$$

$$\begin{array}{r} 11 \frac{1}{2} \text{ ft} \\ 3 \frac{1}{2} \text{ ft} \\ \hline 15 \text{ ft} \end{array}$$

63



Edison's Faradic machine
 April 29th 1859
 J. Munroe
 No 130



4 1/2

9 1/2 x 9

63

FILED IN SECTIONS

1	2
---	---

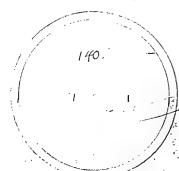
Syno

(144' 1/2" x 144')

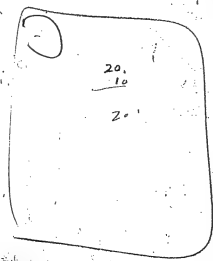
5.00.

10, 25.0,
18, 5.0
22.5,

1200.



374.



3. 12. 0. 0.
12. 11. 5.
12. 11. 5.
12. 11. 5.
12. 11. 5.

3- / 3
4- 43
7- 0
3- /
4-
1-

FILMED IN SECTIONS

1

(2015: 28, 279)

5.00.

10, 25-0,

18,

23

2245

700

1

10 of 20

140.

374.

1000

20.

10

2.

3-13 West

4-43 Earth

7-56

3. / 3 W

4-20 W

1-7 Mel.

$$\begin{array}{r} 12.43 \\ 7 \overline{) 12.43} \\ \underline{7} \\ 5 \\ \underline{3} \\ 2 \\ \underline{1} \\ 1 \\ \underline{0} \\ 0 \end{array}$$

FILLED IN SECTIONS

1	2
---	---

25. 1/8 inch
1/8 inch
1/8 inch

Edwards Forster machine
May 6th 1877
J. H. Hines
No. 100.



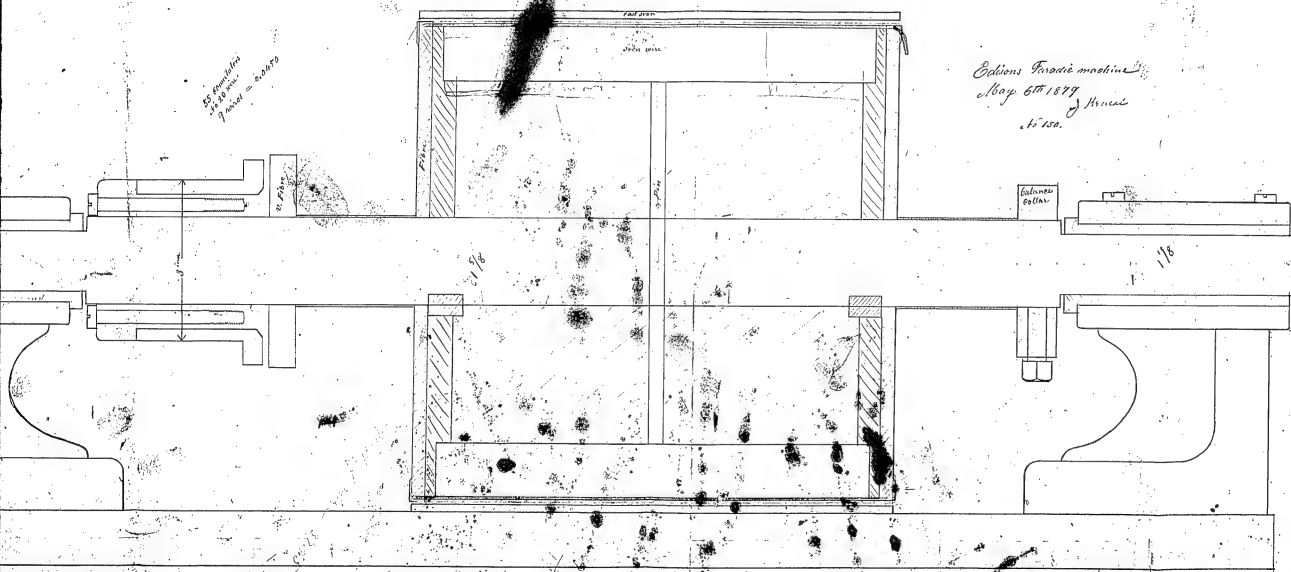
FILMER IN SECTIONS

1	2
---	---

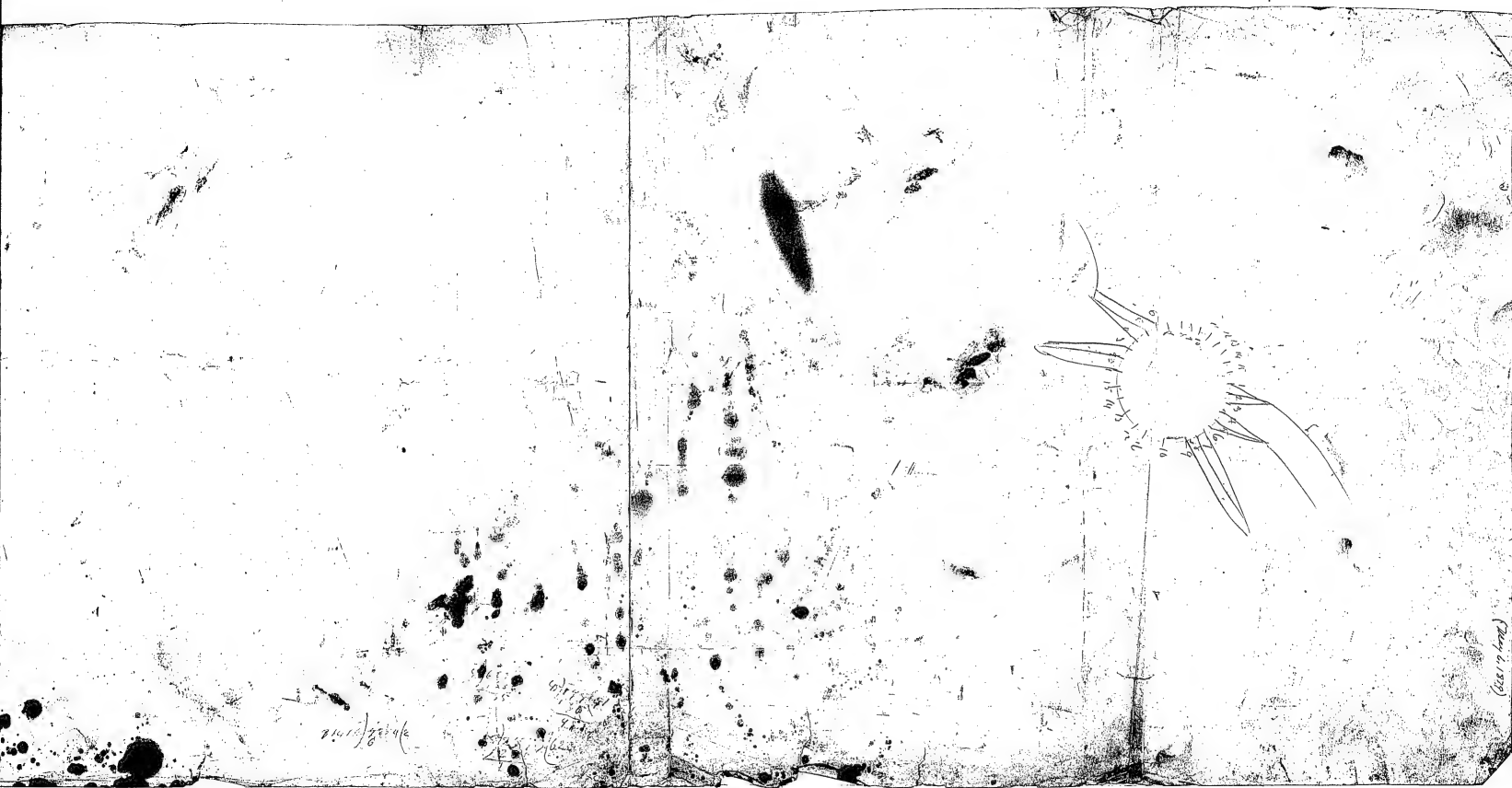
50 pounds
1000 lbs
9 inches in 1000

Exhausts Ford's machine
May 6th 1877
10th Street

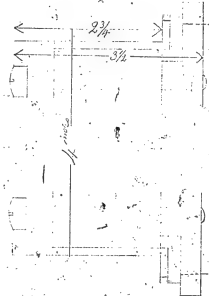
8.33
68.5025/50.3
10.62
10.62
10.62



12.50



39 Centimeters



For Patent Office
copy 12-18-1934

$$\begin{array}{r} 610 \\ 30 \\ \hline \end{array}$$

$$\begin{array}{r} 1000 \\ 500 \\ \hline \end{array}$$

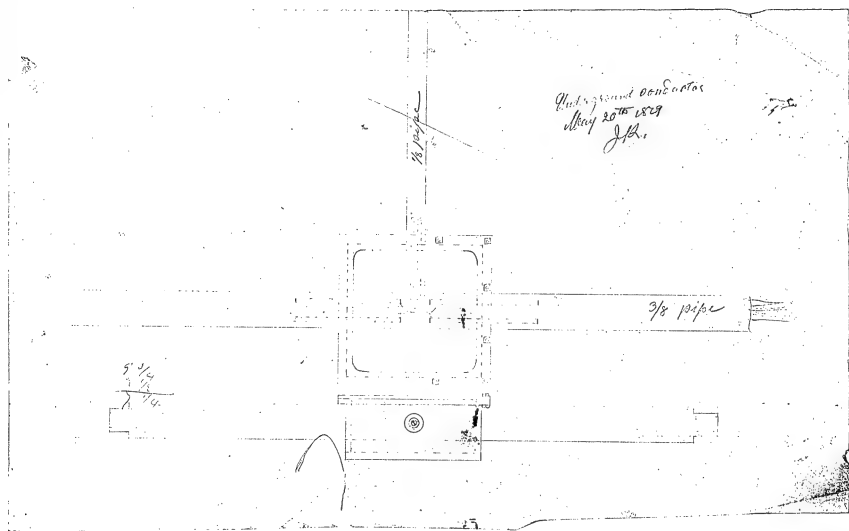
$$\begin{array}{r} 39 \\ 12 \\ \hline \end{array}$$

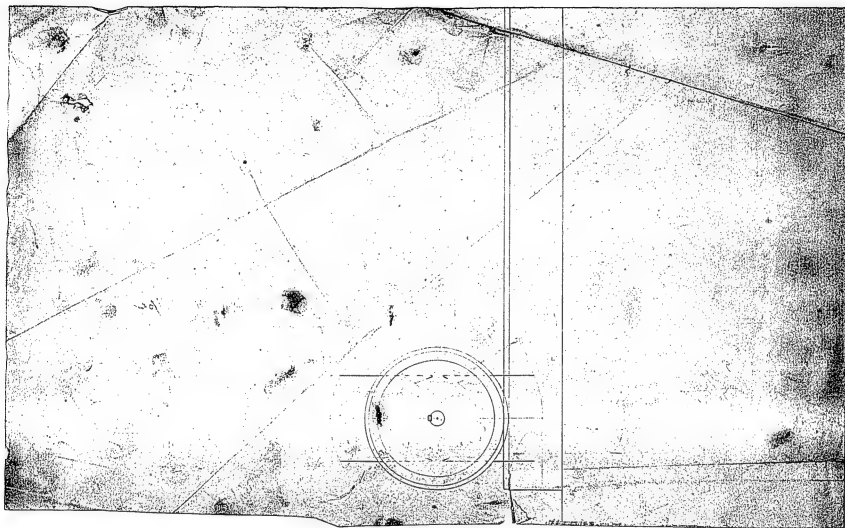
$$\begin{array}{r} 317 \\ 32 \\ \hline \end{array}$$

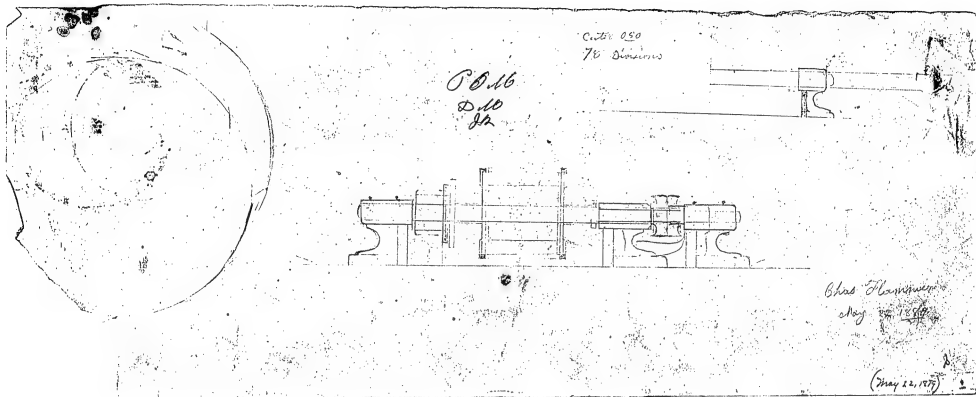
$$\begin{array}{r} 39 \\ 11 \\ \hline \end{array}$$

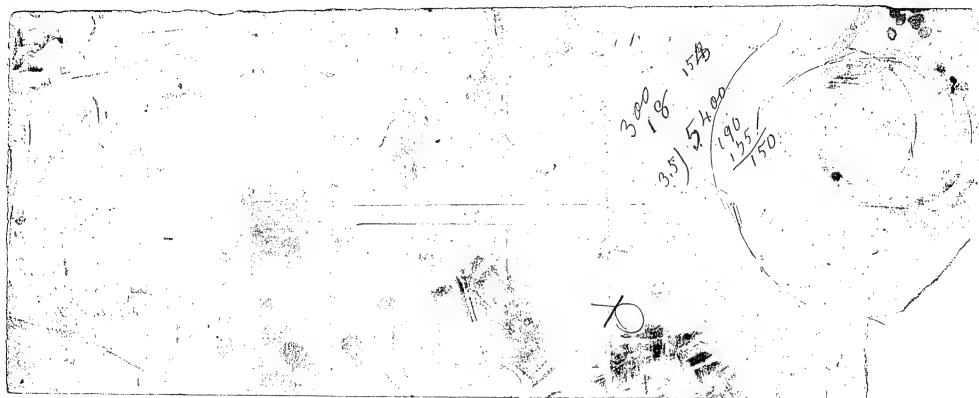
$$\begin{array}{r} 29 \\ 19 \\ \hline \end{array}$$

$$\begin{array}{r} 29 \\ 23 \\ \hline \end{array}$$









9 ft 9 in
10 ft 1 in

find to a ft.

Edison's Dynamometer
June 18, 1877
J.E.H.

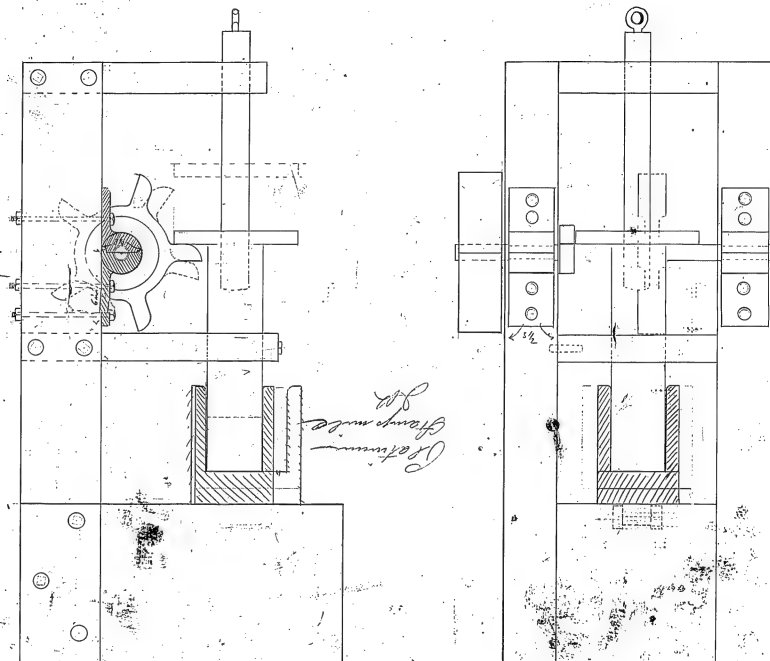
6" diameter
10" } top & bottom
flanges
1/2" wide point
flange 1" high & 1/2" thick

bottom
flange

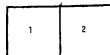
full size

scale point
1/4

Shaping mill frame 415 1117
3/16

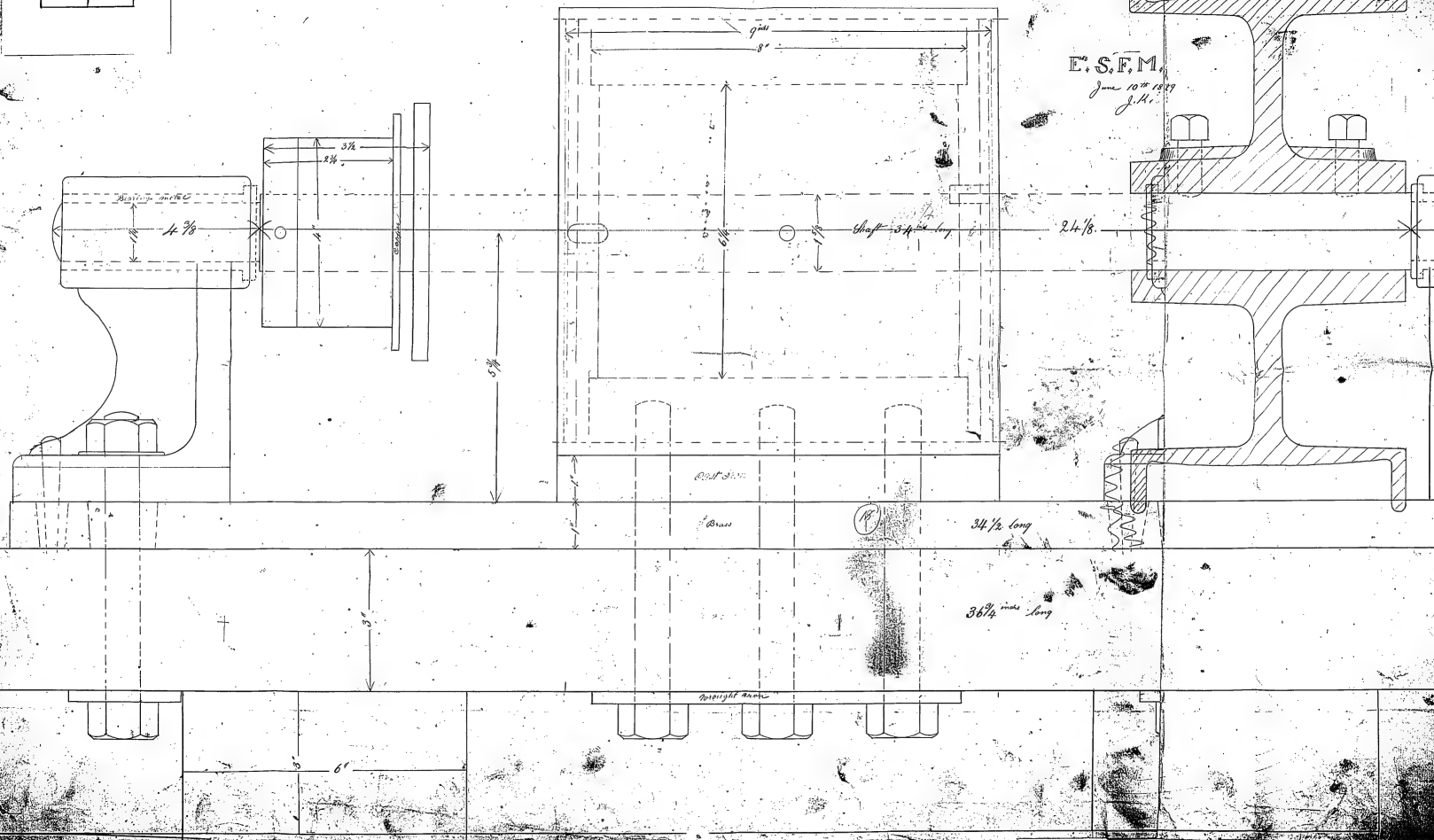


FILMED IN SECTIONS



71

E. S. F. M.
June 10th 1919
J. H.



FILMED IN SECTIONS

2

E. S. F. M.

June 10th 1889

J. K.

Shaft - 3 ft. long

 $24\frac{1}{8}$ $5\frac{1}{2}$

34 1/2 long

36 $\frac{3}{4}$ inches long

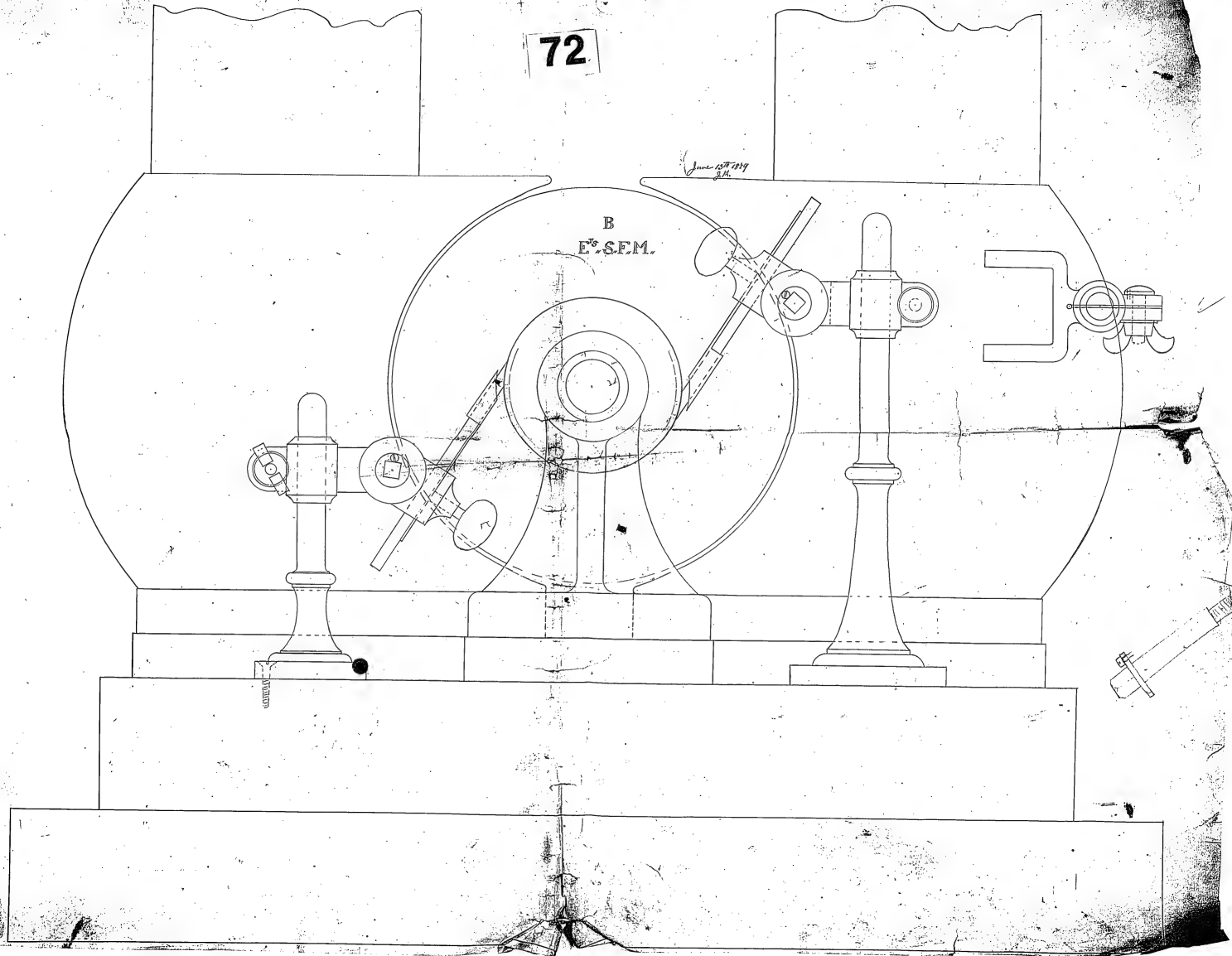
Insight No. 5

2. 2-6

72

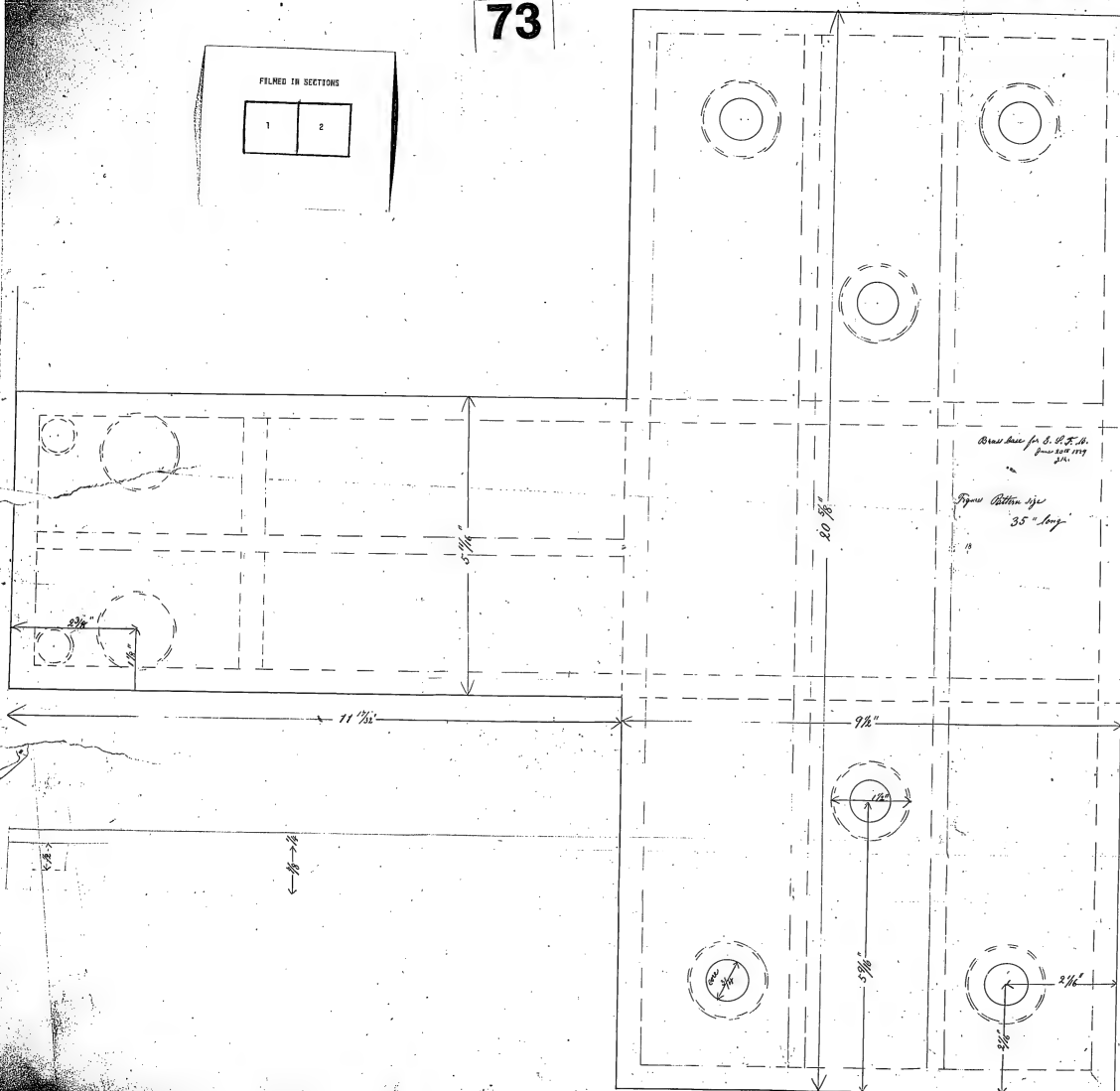
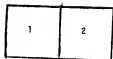
June 27 1819
J.H.

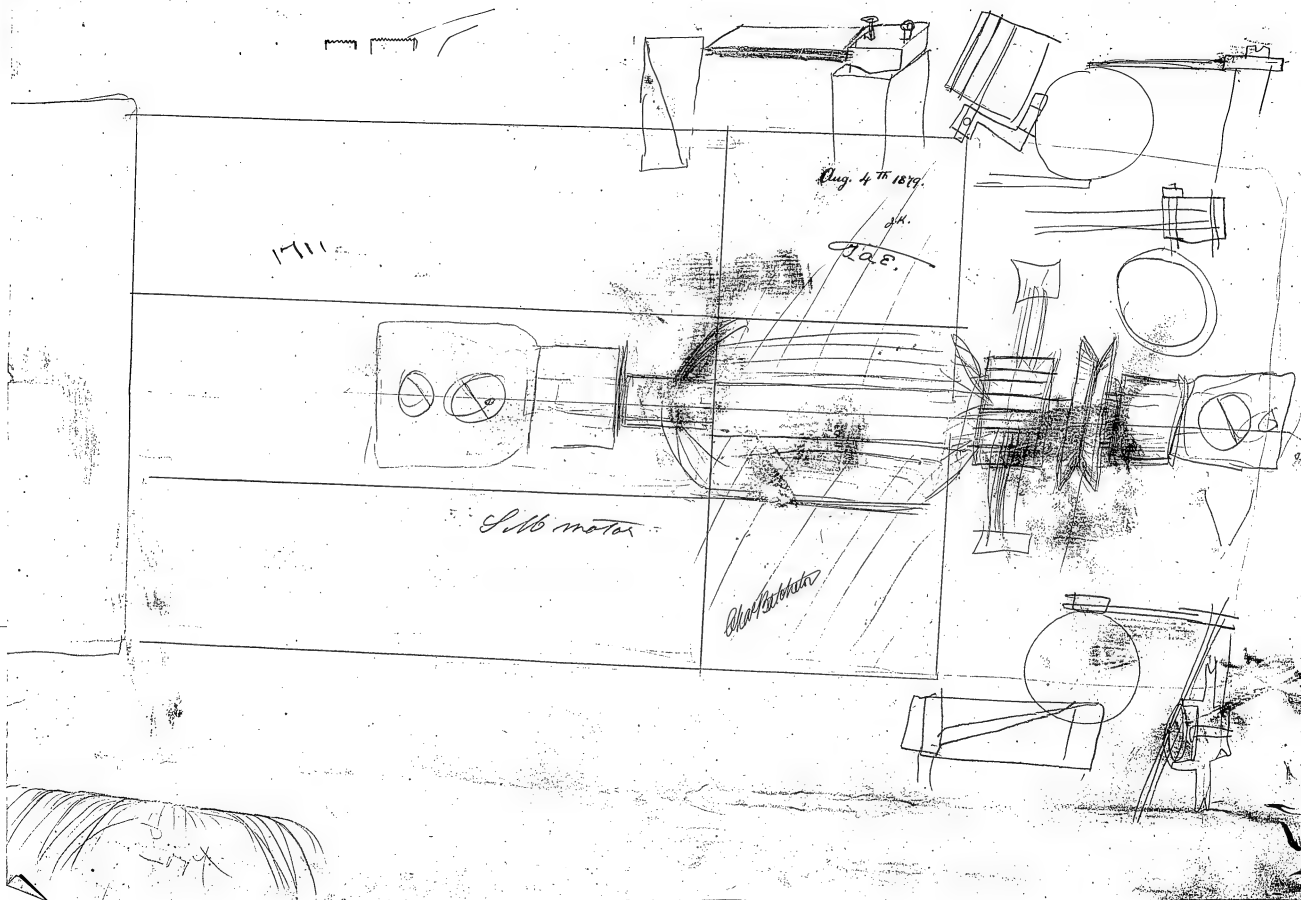
B
F. SEM.



73

FILMED IN SECTIONS





4 of this & must
have the disc for
handle with cup
finger button on

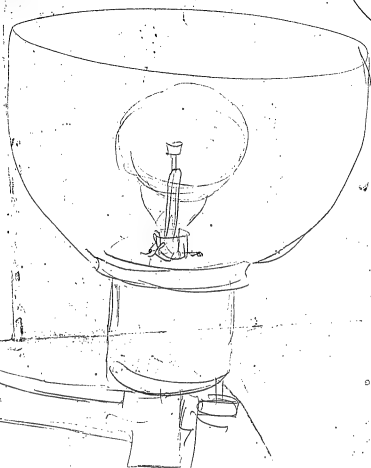
Don't forget the money
if there is a package
by express for me send it
to house & leave on steps

Mr Kueser

Will you put this
coil in place of the one on
the base right away

Pat Cleto

Order mahogany boxes ^{base} like these
but with in hole in top



20
62
36

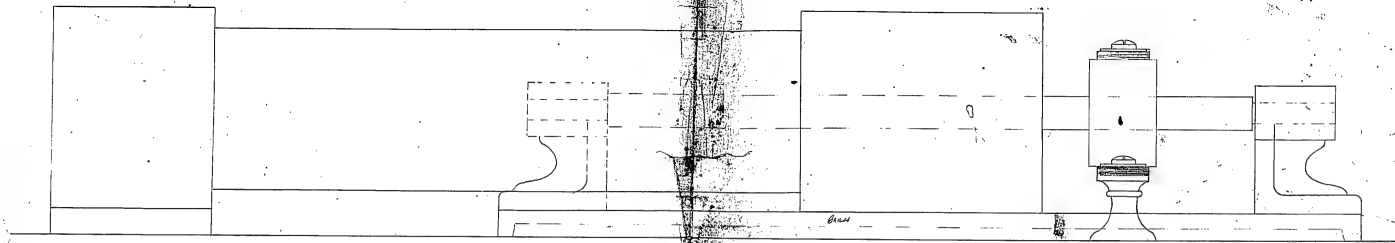
220
12/11/12

123
12/11/12

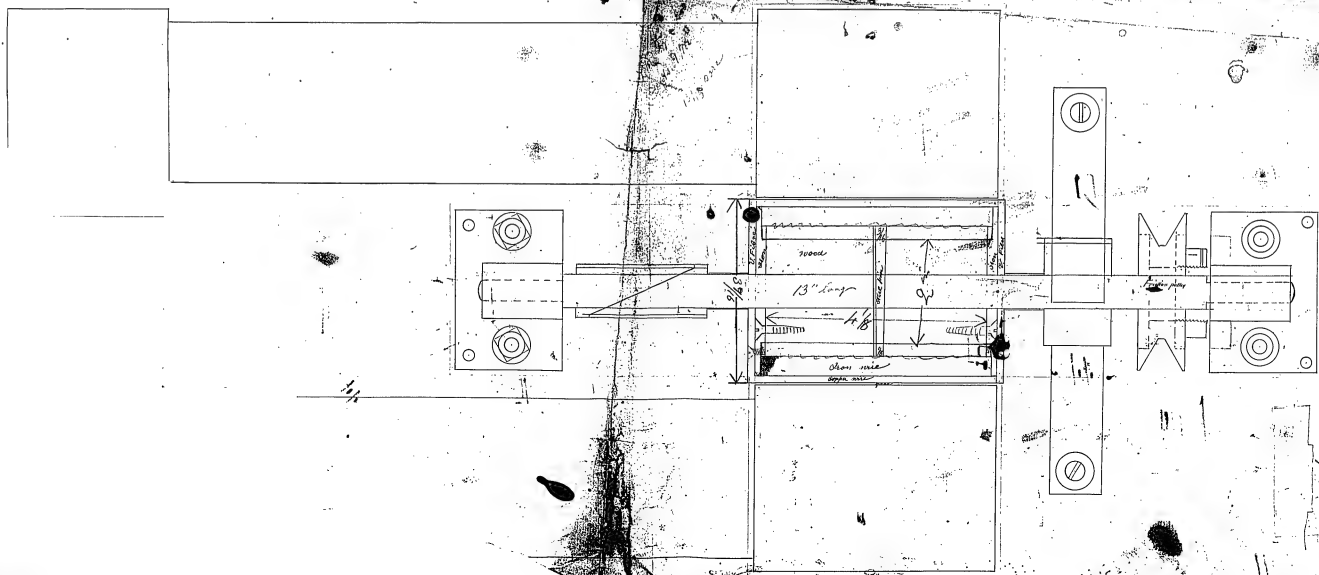
75

Aug. 11 1941
J.H.

L. W. Boston

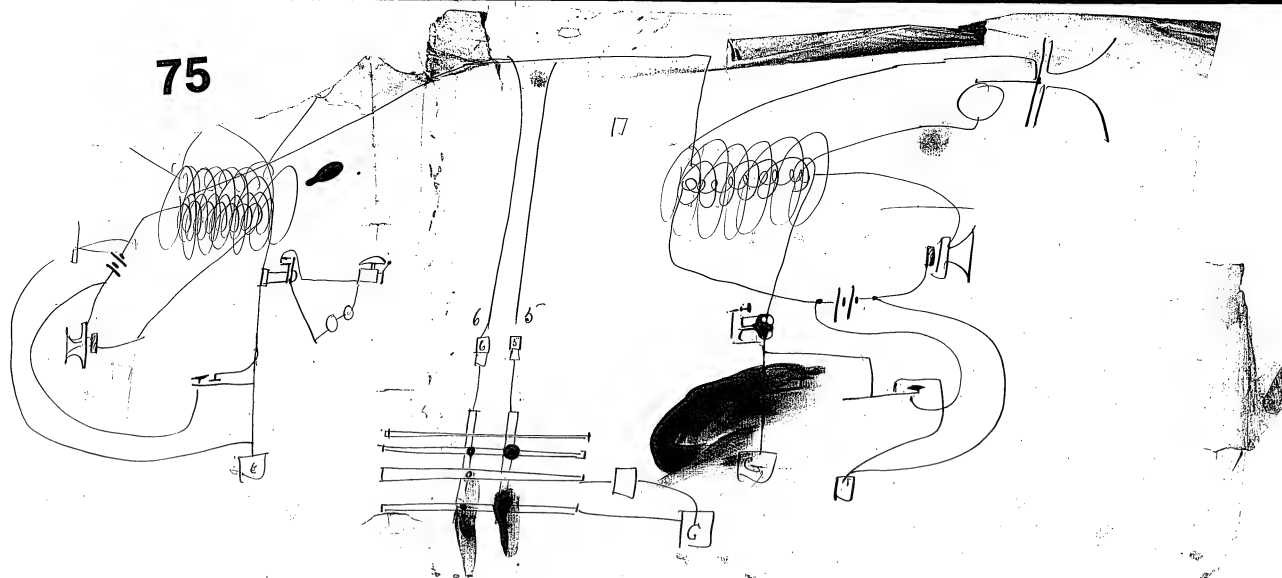


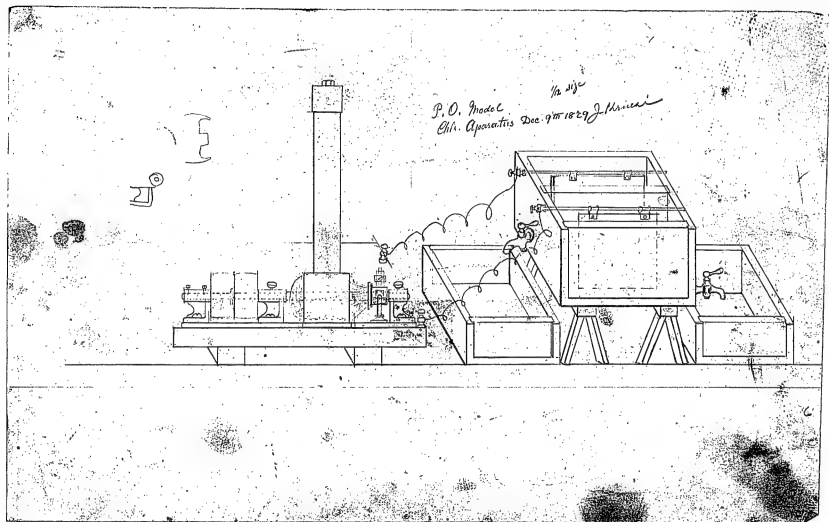
Splicing machine motor

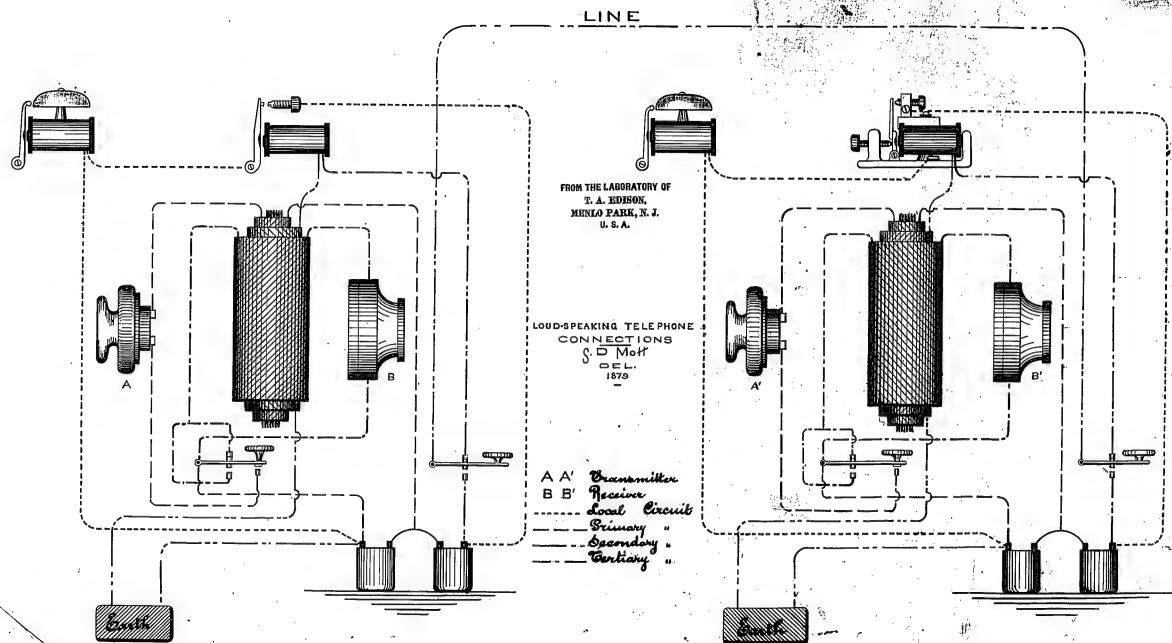


1/6 B. 1/3

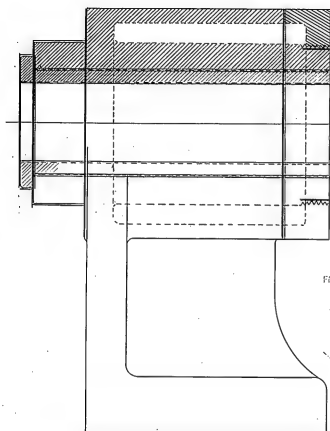
75



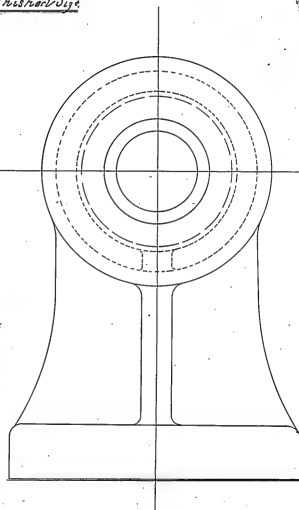




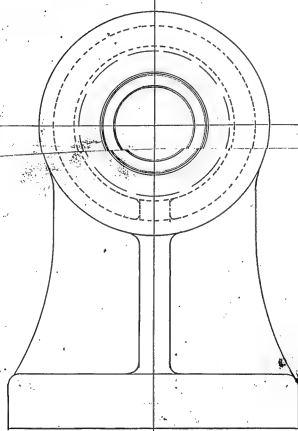
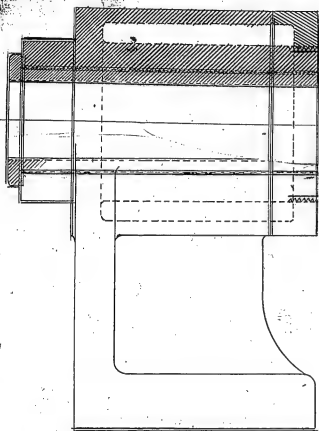
Full Finished Size

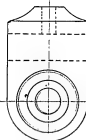
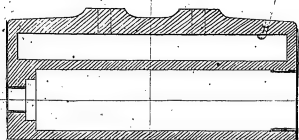


FROM THE LABORATORY OF
T. A. EDISON
MENLO PARK, N. J.
U.S.A.
Feb 25. 1880

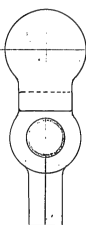
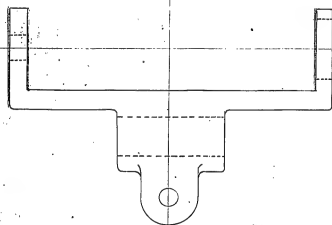
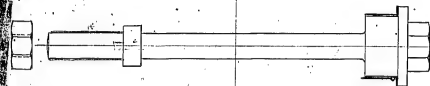
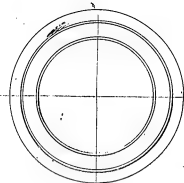


Full finished fig.

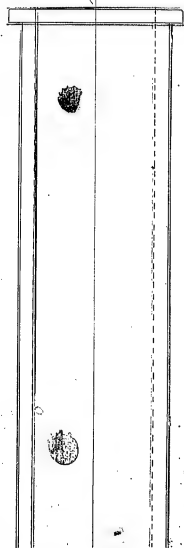
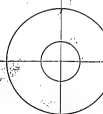
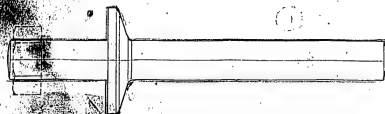


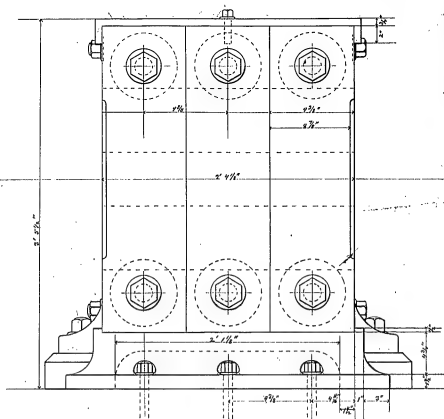


*Full-finished size
Two of each*



DESIGNED BY
T. A. JOHNSON
ENGINEER
NEW YORK, N.Y.
U.S.A.

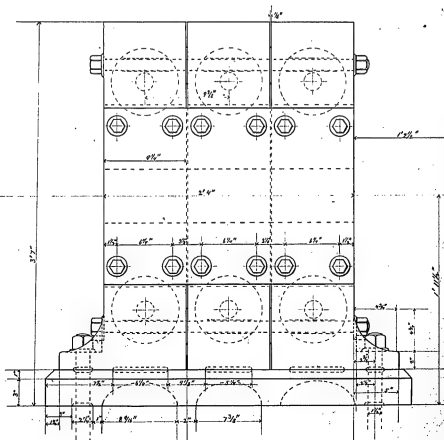




MENLO PARK N.J.

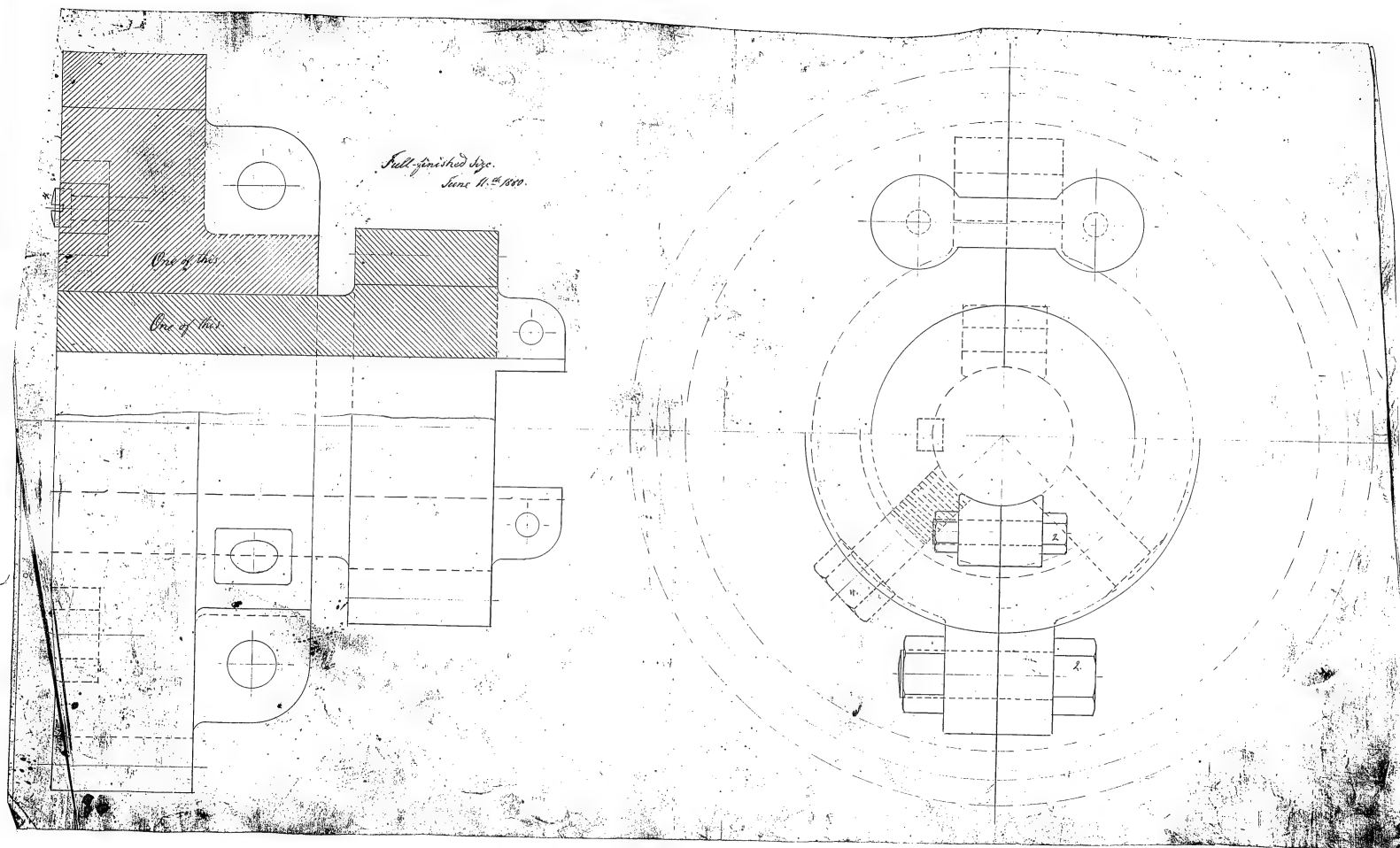
MAY 1880.

Scale 2" to 1'.



Twelve Face of Pillow Block, Compulsator Side.

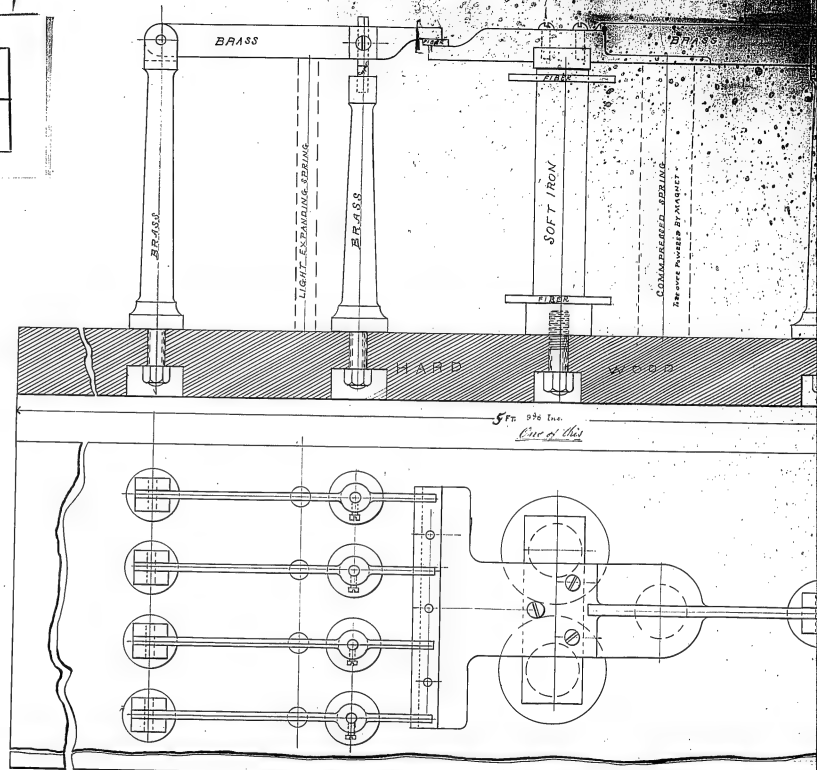
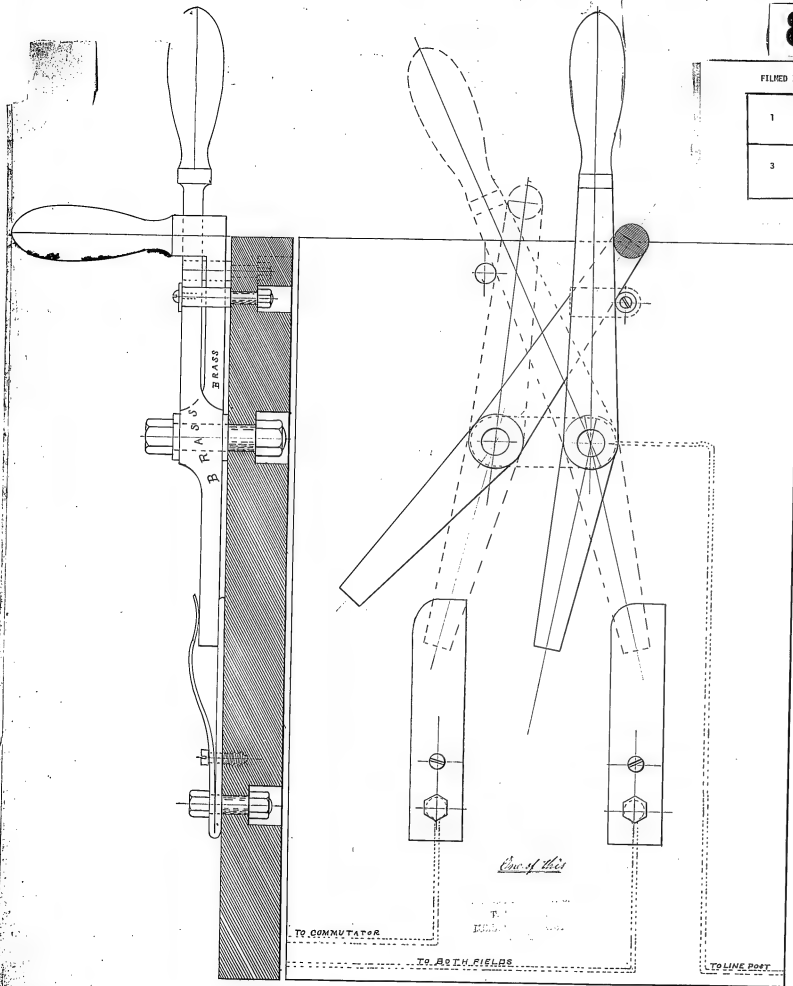
$$\begin{array}{r} 29\frac{3}{4} \\ 4\frac{1}{2} \\ \hline 34\frac{1}{2} \\ 4\frac{3}{4} \\ \hline 29\frac{1}{2} \end{array}$$



83

FILLED IN SECTIONS

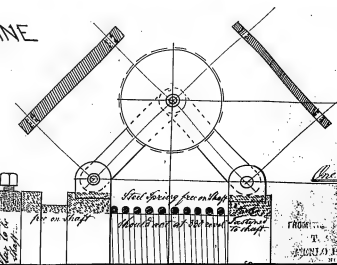
1	2
3	4



FIVE HORSE POWER
MAGNETO-ELECTRIC ENGINE
FULL SIZE

EDISON'S LABORATORY

MENLO PARK N.J.
 NOV. 8TH 1880

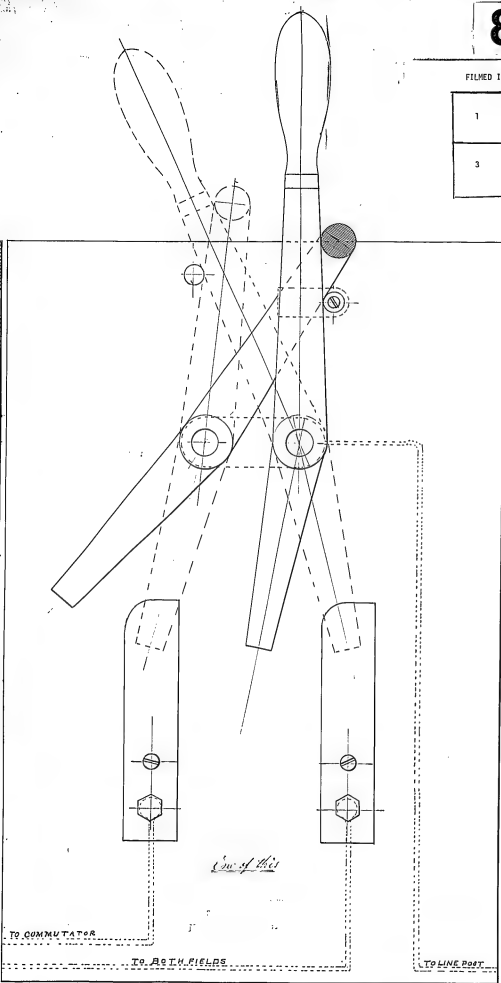
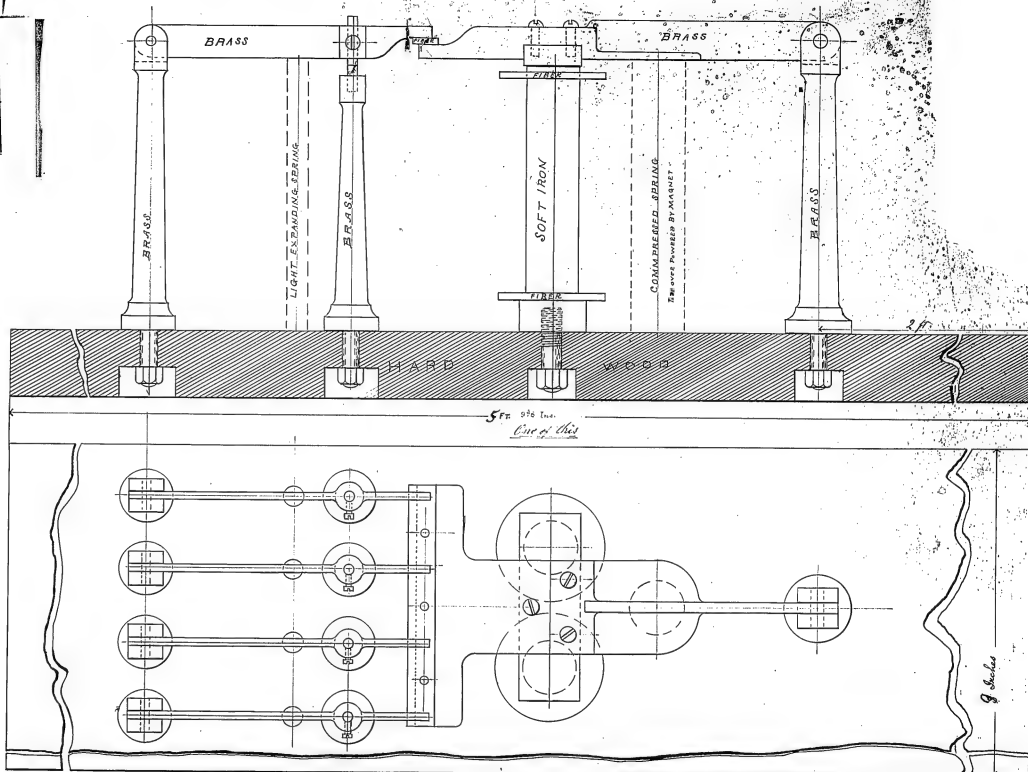


Edison's Patent for the
 (as per patent to the public)

83

FILMED IN SECTIONS

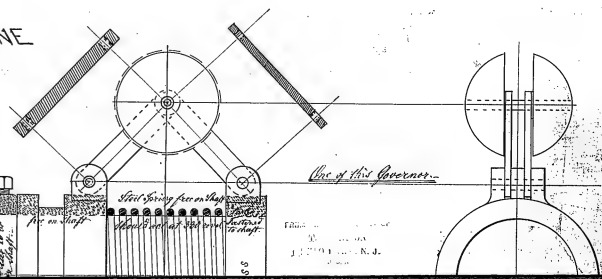
1	2
3	4



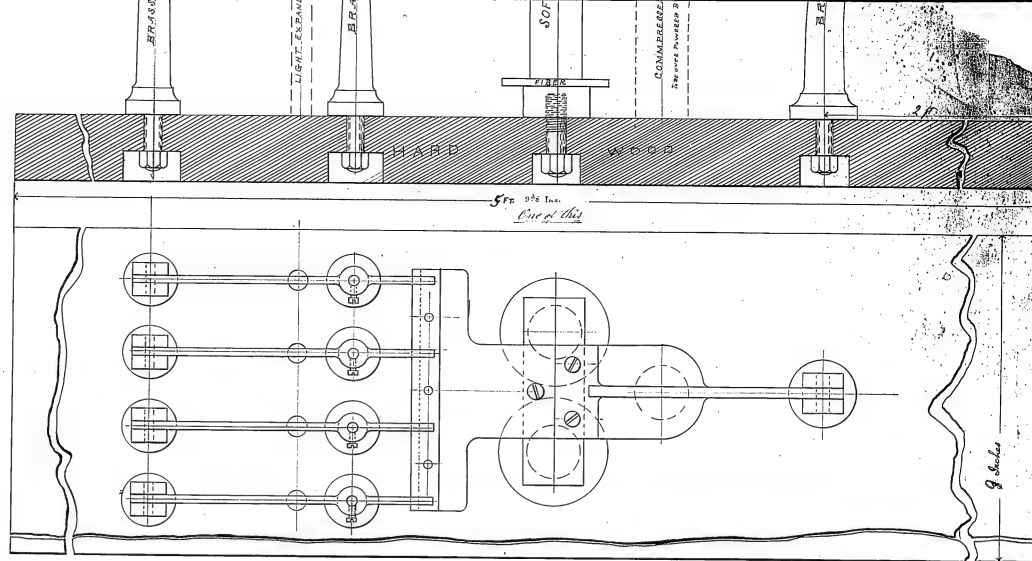
FIVE HORSE POWER
MAGNETO-ELECTRIC ENGINE

FULL SIZE

EDISON'S LABORATORY
MENLO PARK N.J.
MAY 8th 1880



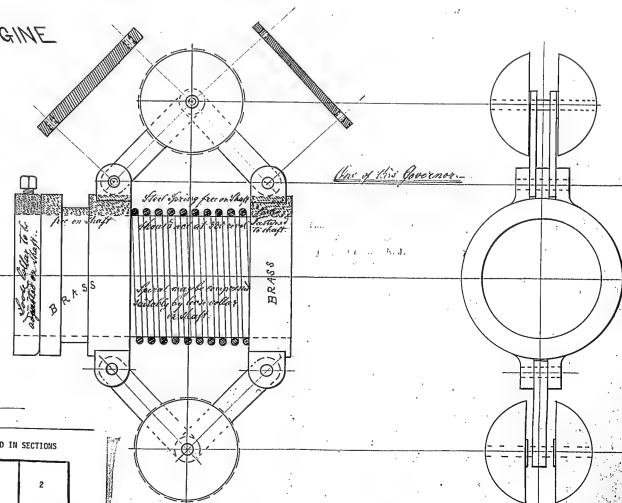
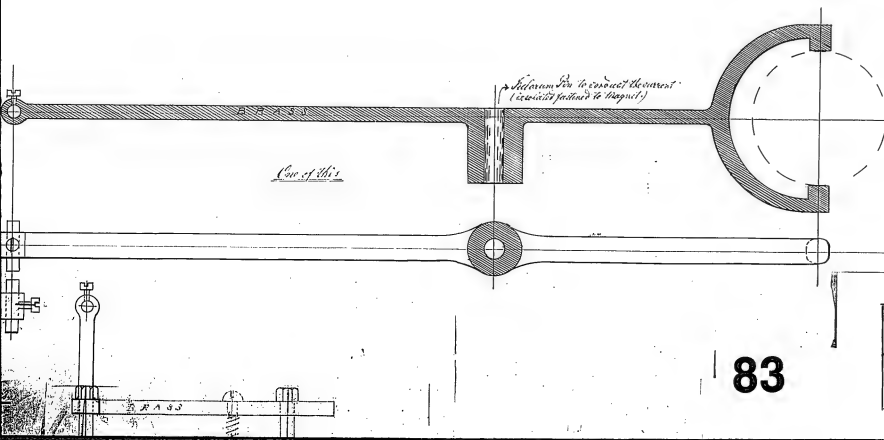
See of this to conduct the current
(as will be found in the diagram)



Also one Hundred Board like above for 8 Cone Posts; indicated in general drawing.

EDISON'S LABORATORY

MENLO PARK N.J.
Nov. 8TH 1880



FILMED IN SECTIONS

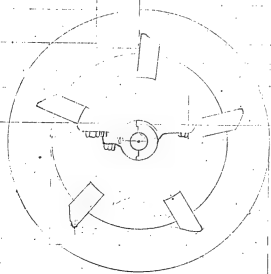
1	2
3	4

MENLO PARK MACHINE SHOP DRAWINGS, UNDATED

(Reduction Ratio = 18:1)

84

Stamp mill
2 H.



20
Palma

155
 130

25

29 200

3/4

155

10

205

200

205

190

14

200

205

190

2 5/8

23

14

200

205

190

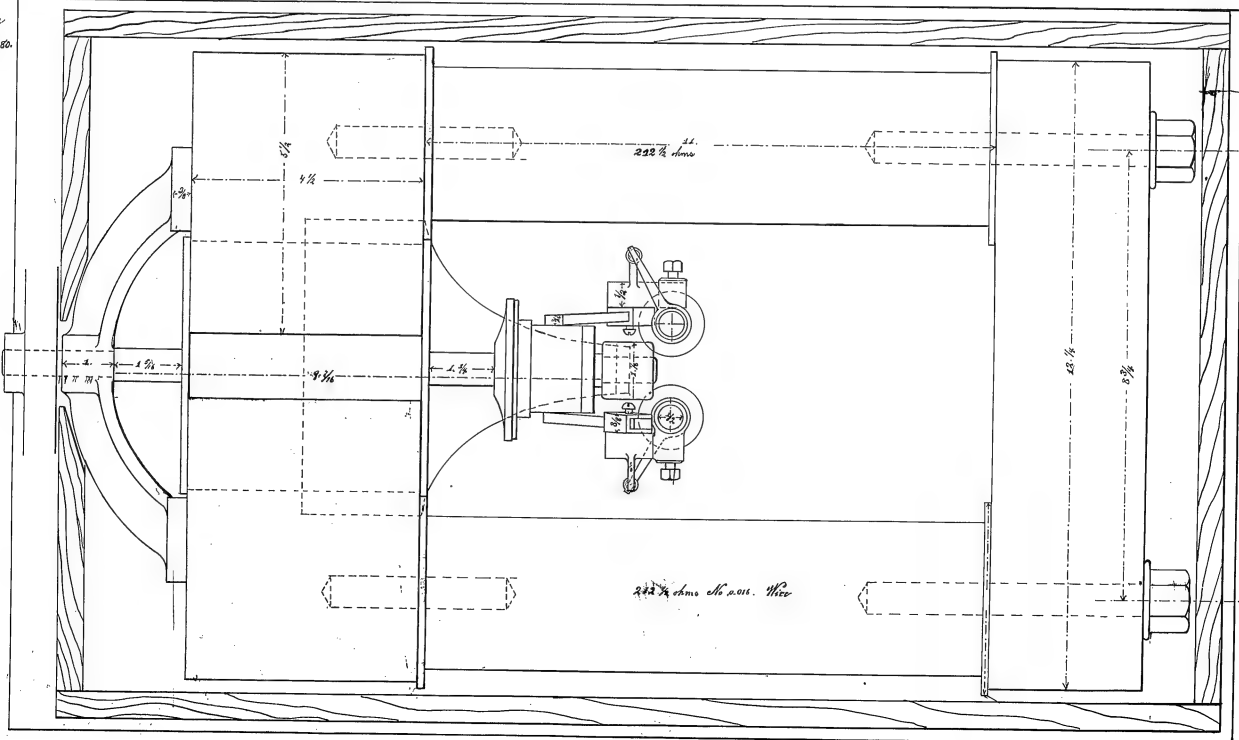
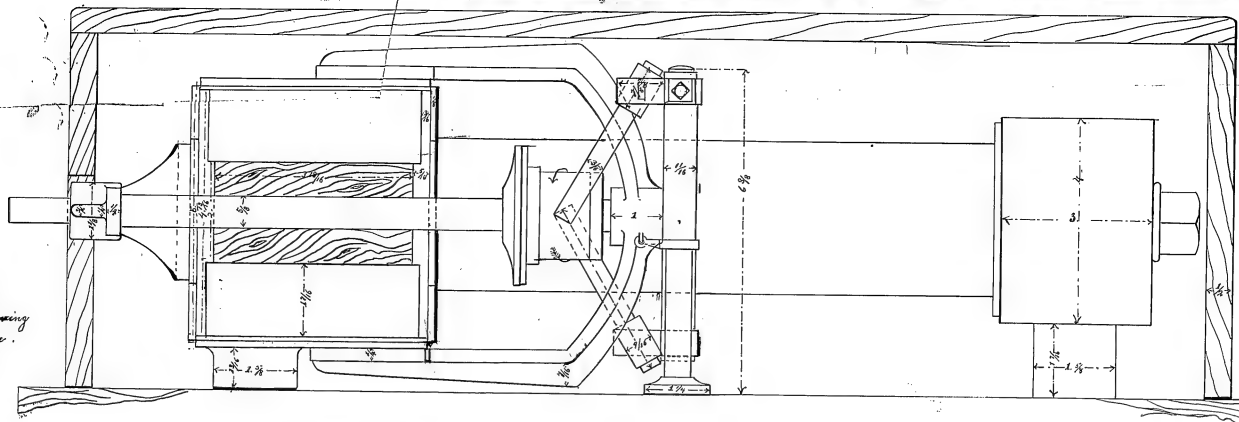
150

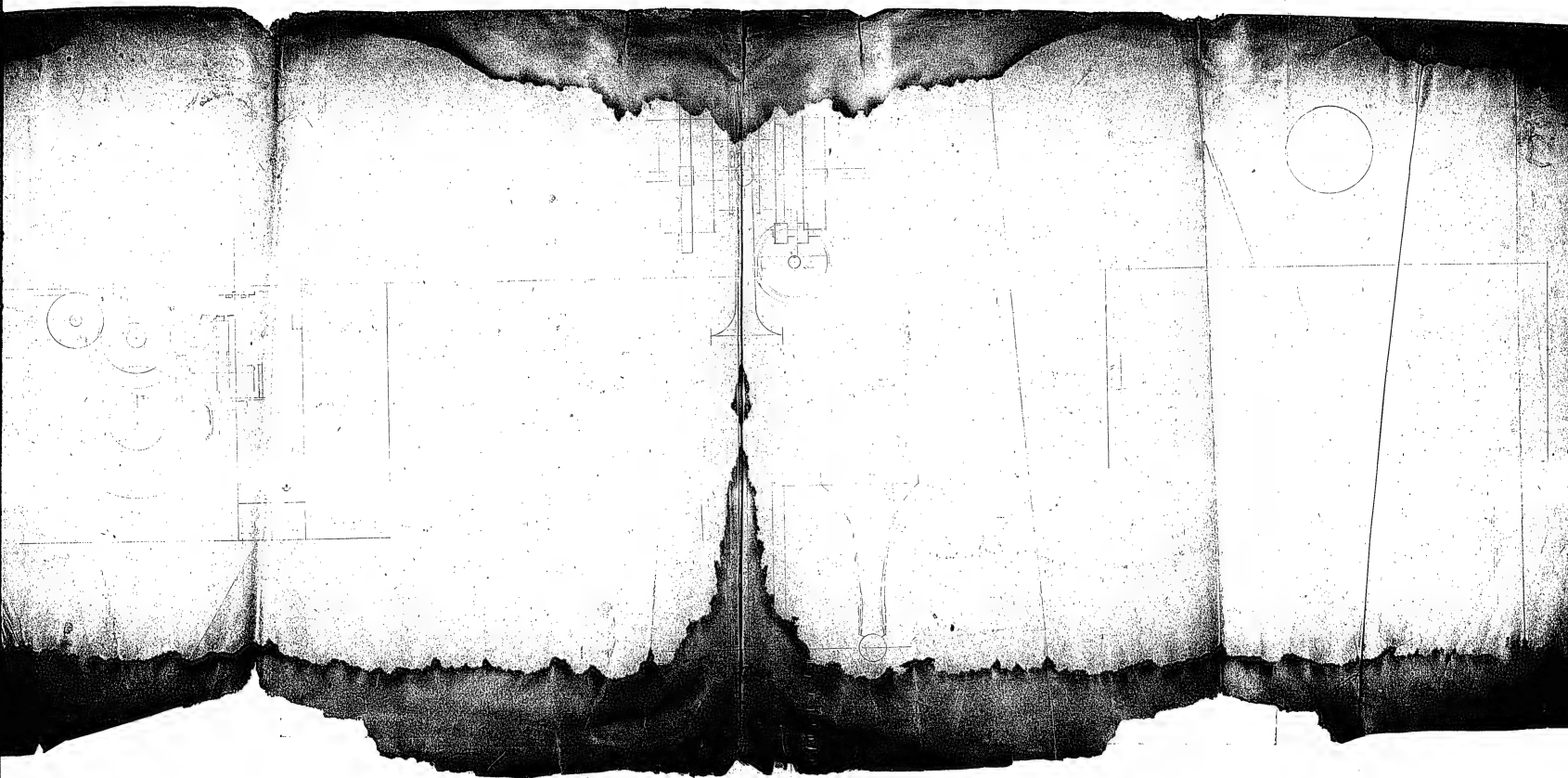
85

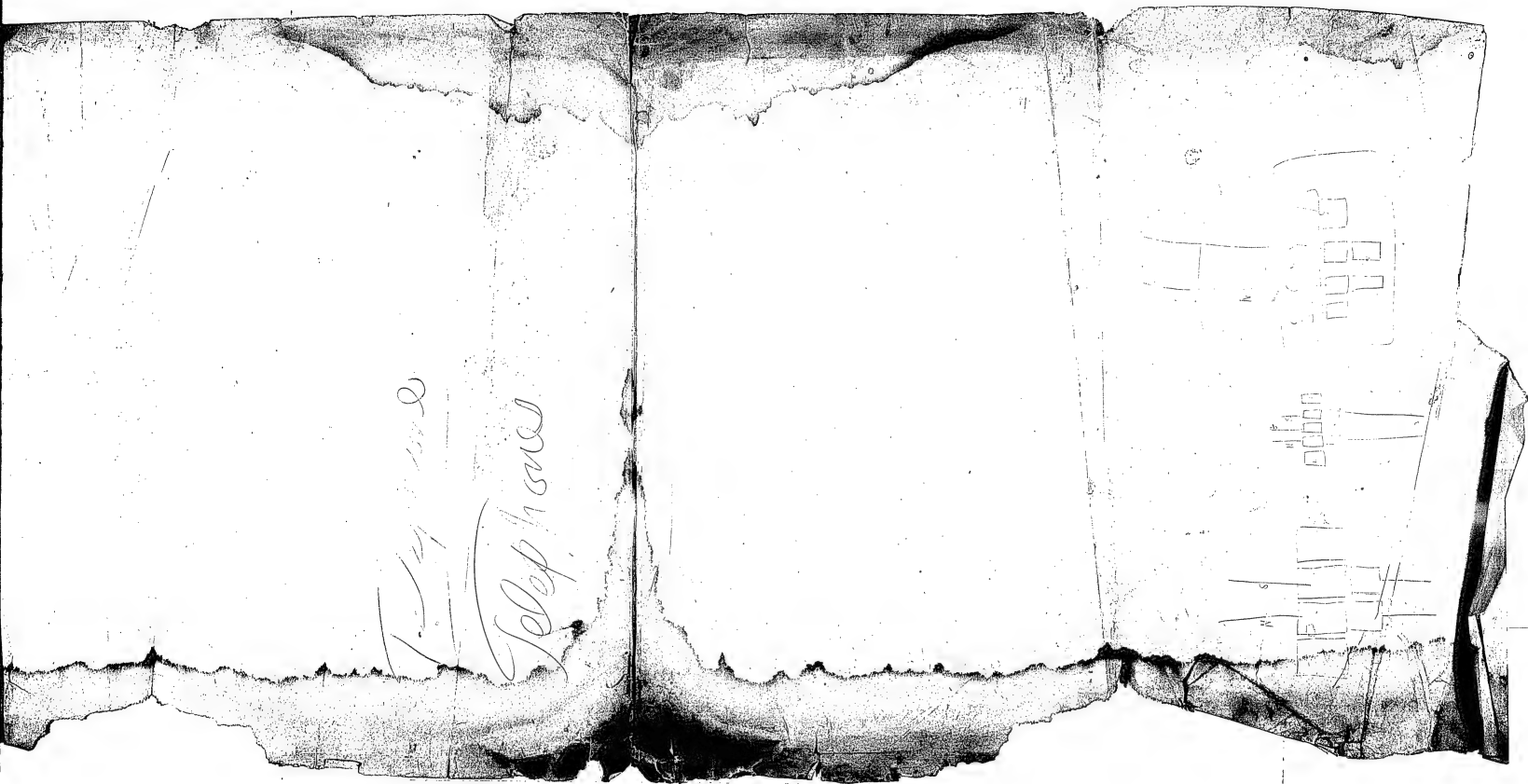
Commutator cut into 9. breaks.
 Armature into 18 spaces. leaving
 .050 standing between each space.
 Wires with No 25 B.N.S.

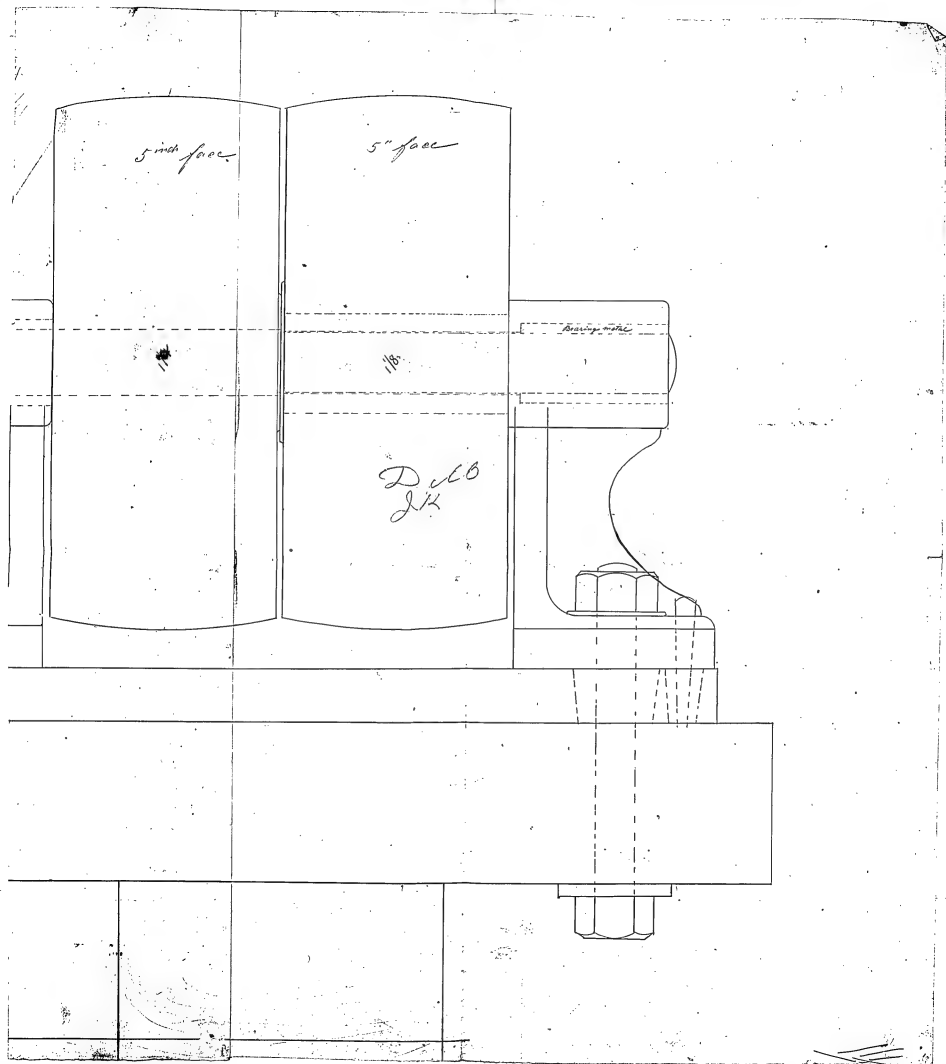
into two legs

Making .050 two thickness
 .005. each. .005. each.
 German silver wire for binding
 .050. Space. .005. Total space. .050.









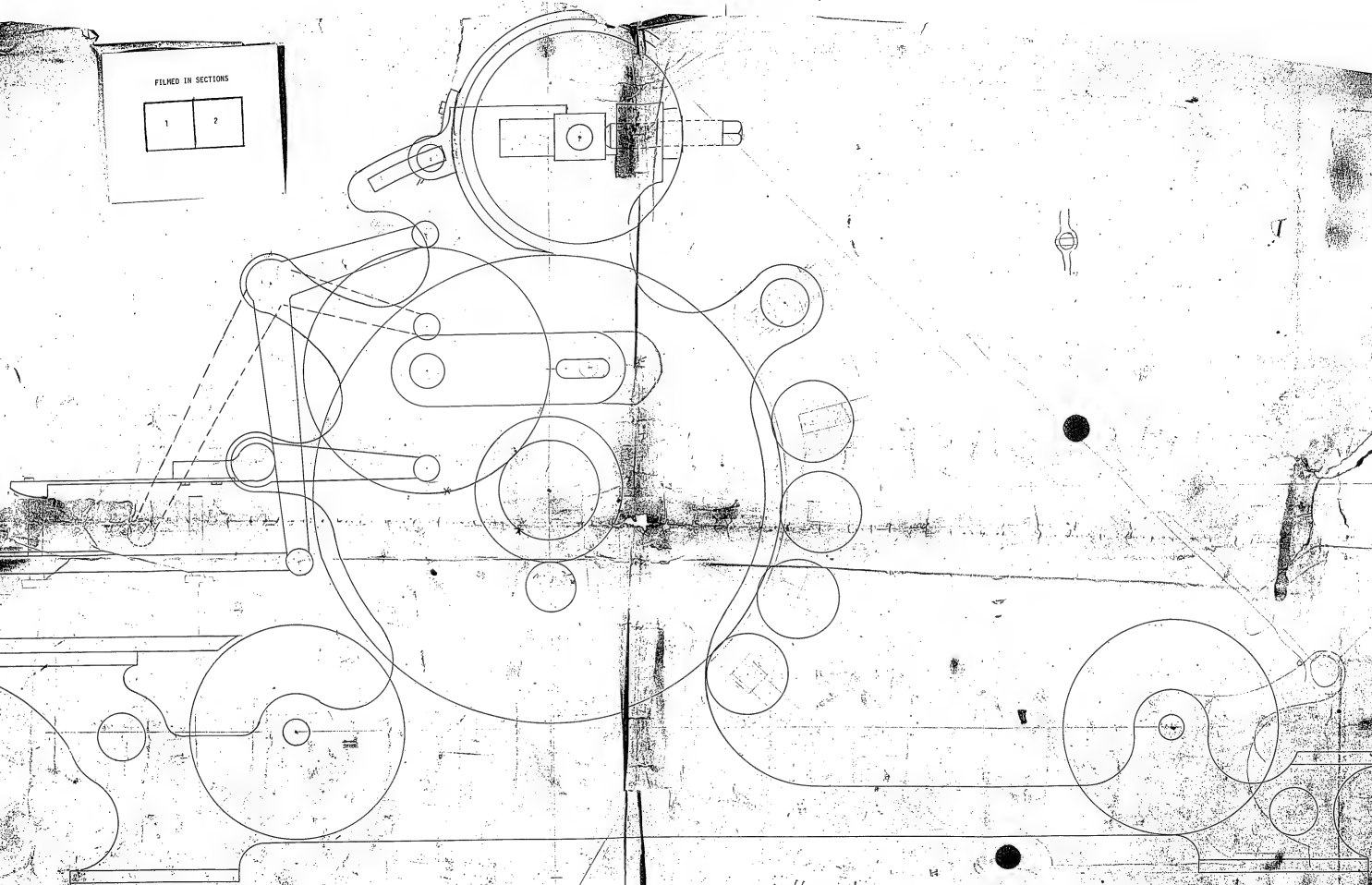
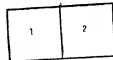
FILMED IN SECTIONS

1

2

Johnson

FILMED IN SECTIONS

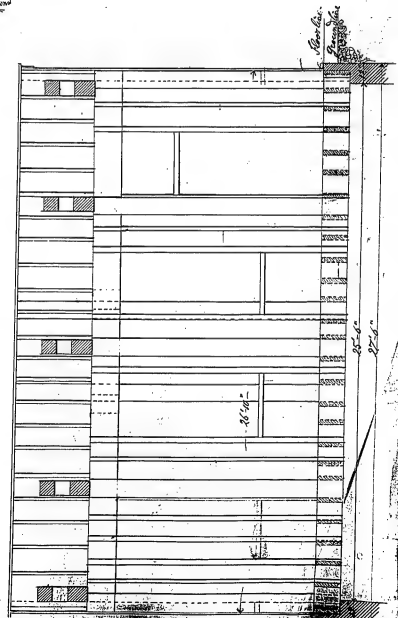
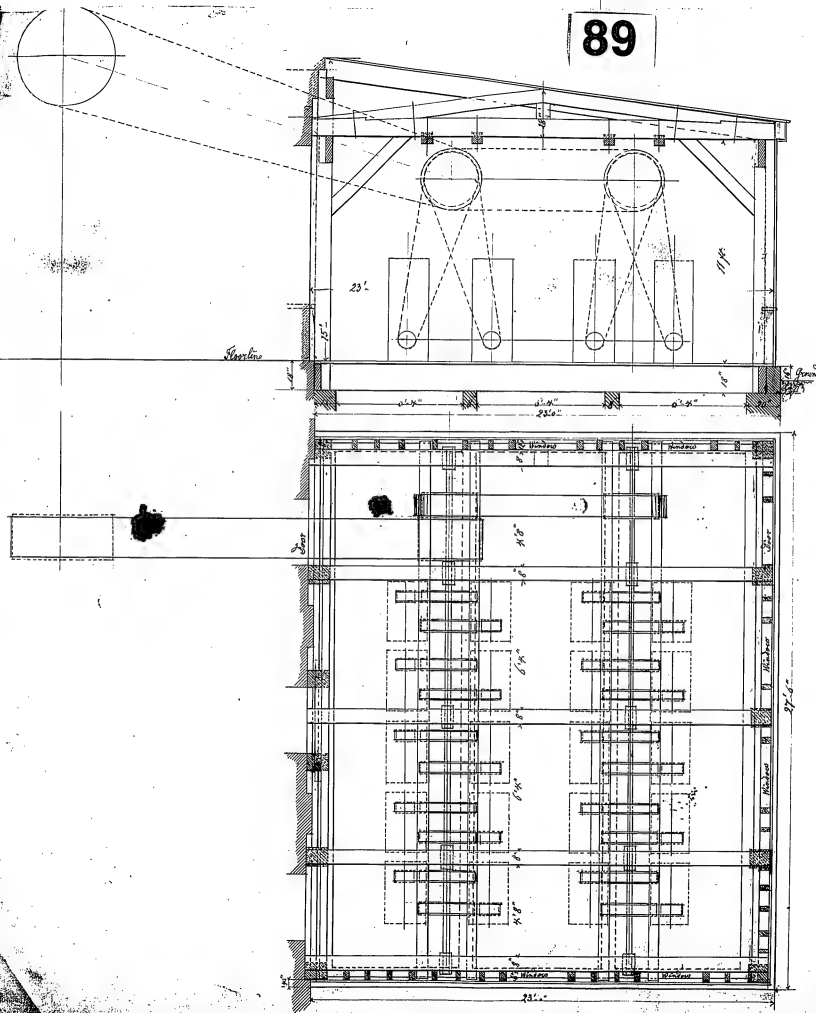
*Johnson*

89

Machine Shop extension.

Scale: 3/8" = 1 foot.

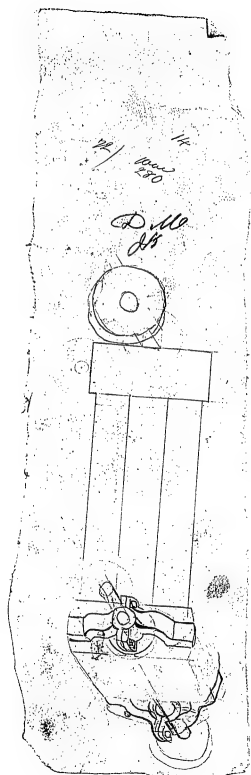
Changed no use.



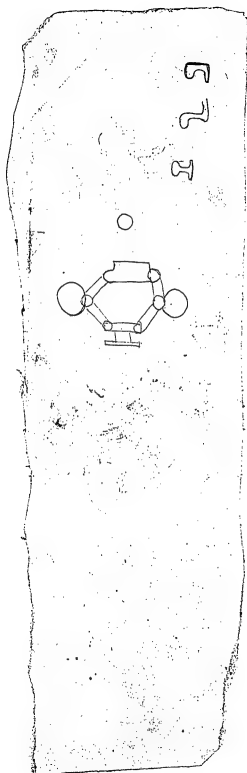
MENLO PARK MACHINE SHOP DRAWINGS, UNDATED

(Reduction Ratio = 14:1)

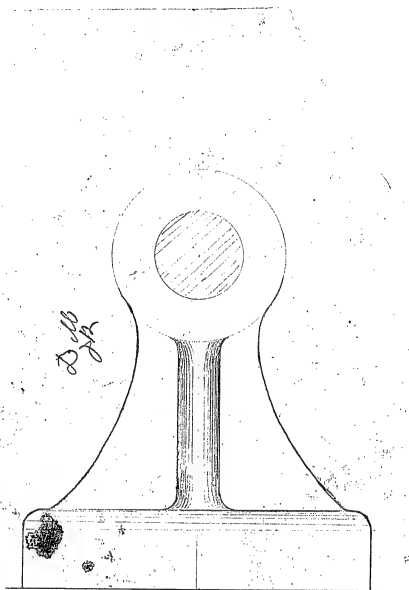
90

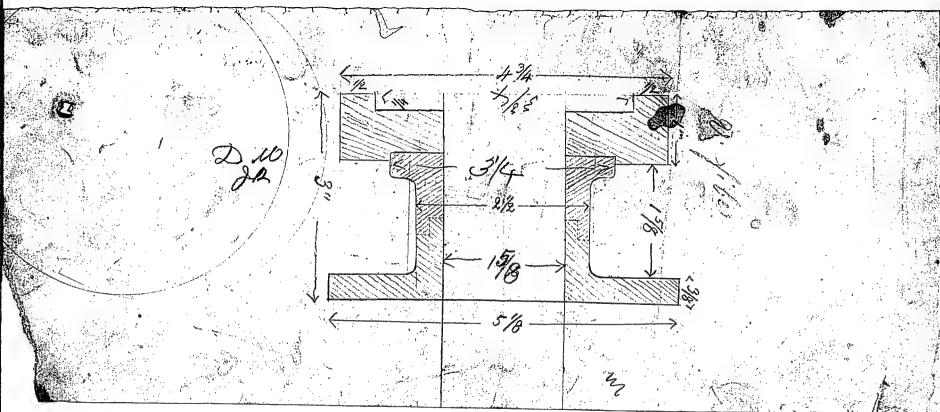


90

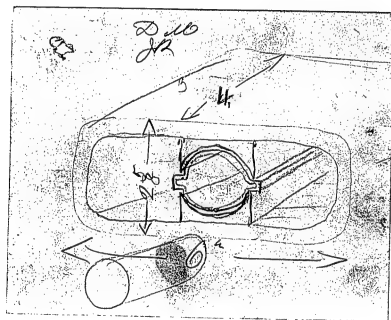


91

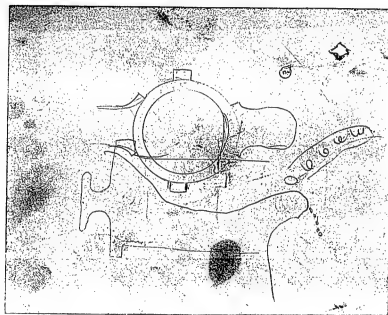




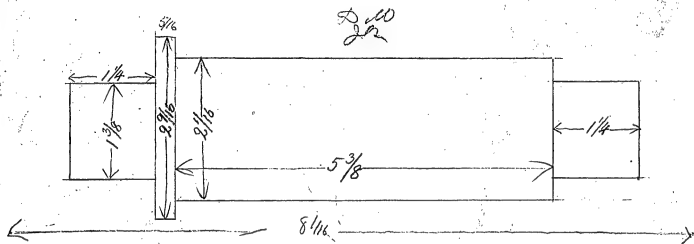
93



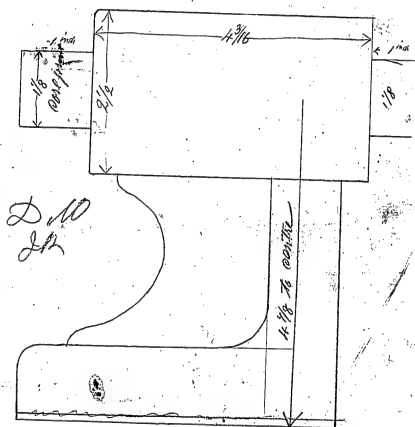
93



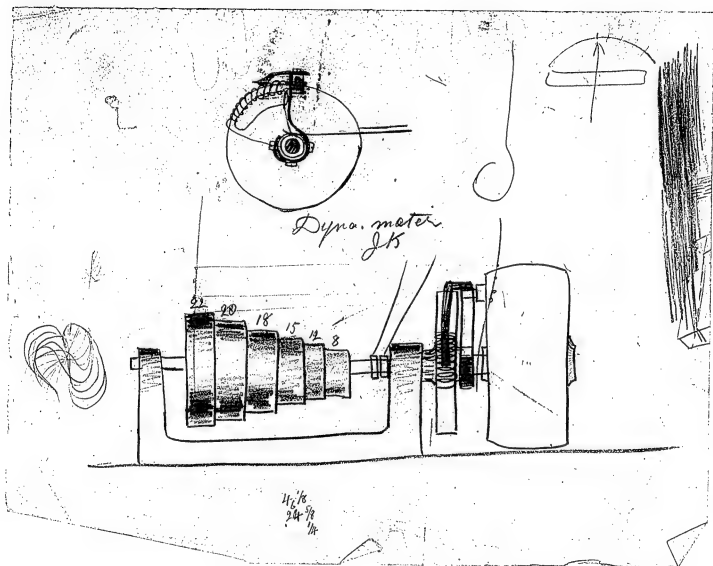
94



95



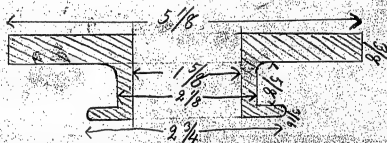
96

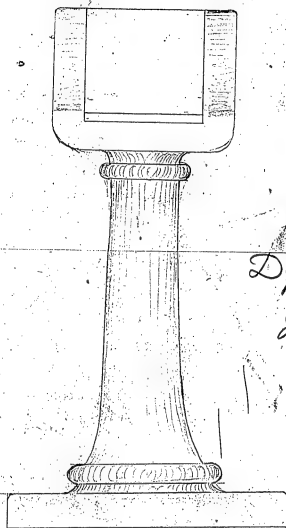


97

D.M.G.
J.H.

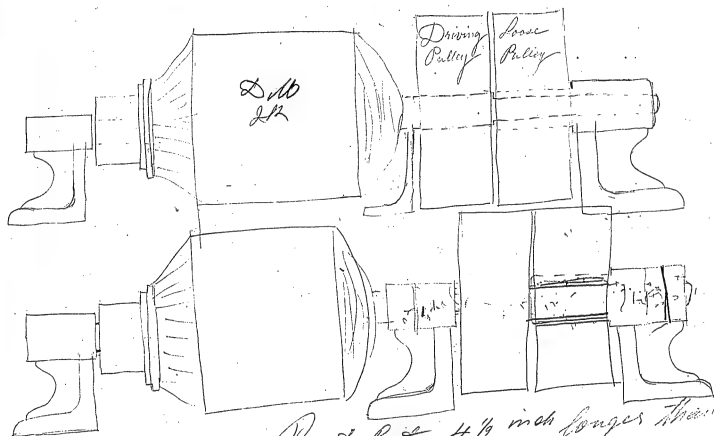
v. fiber





Dynamo

JR

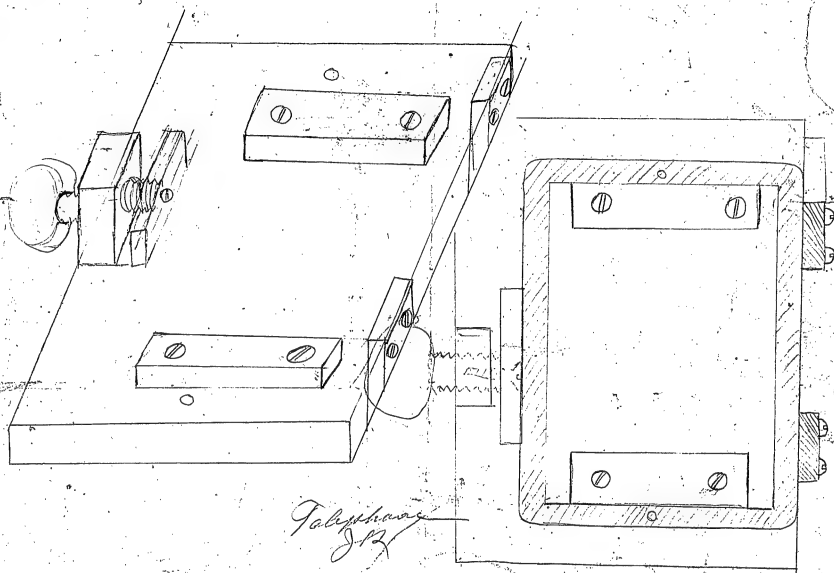


Best but $1\frac{1}{2}$ inch longer than above

100

Mr. Anderson please make this drill
of hard wood

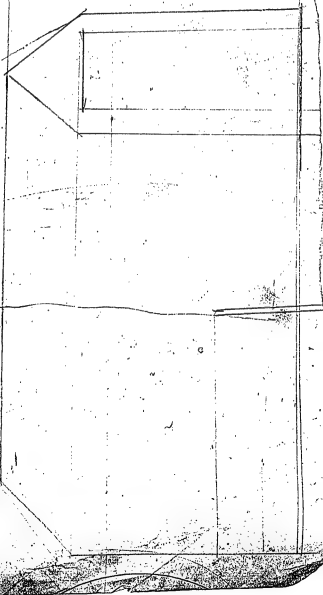
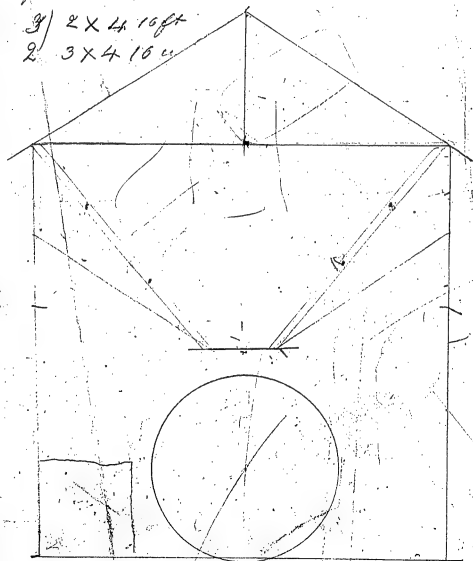
KK.



Talbott
J.P.

100

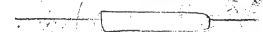
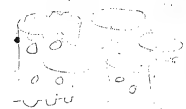
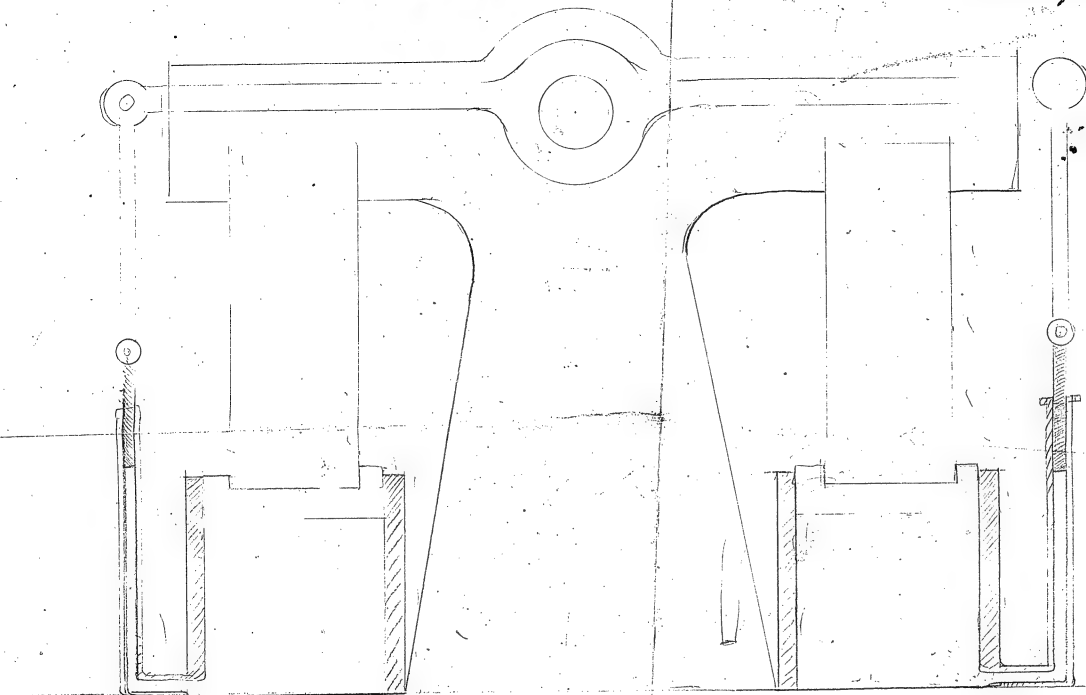
4 16 ft long
6
24 3) 2 X 4 16 ft
2 3 X 4 16 ft



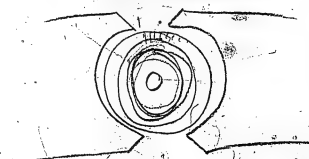
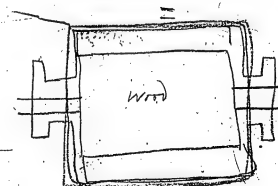
101

Block Light Dynamometer
Batchelor
Hruska

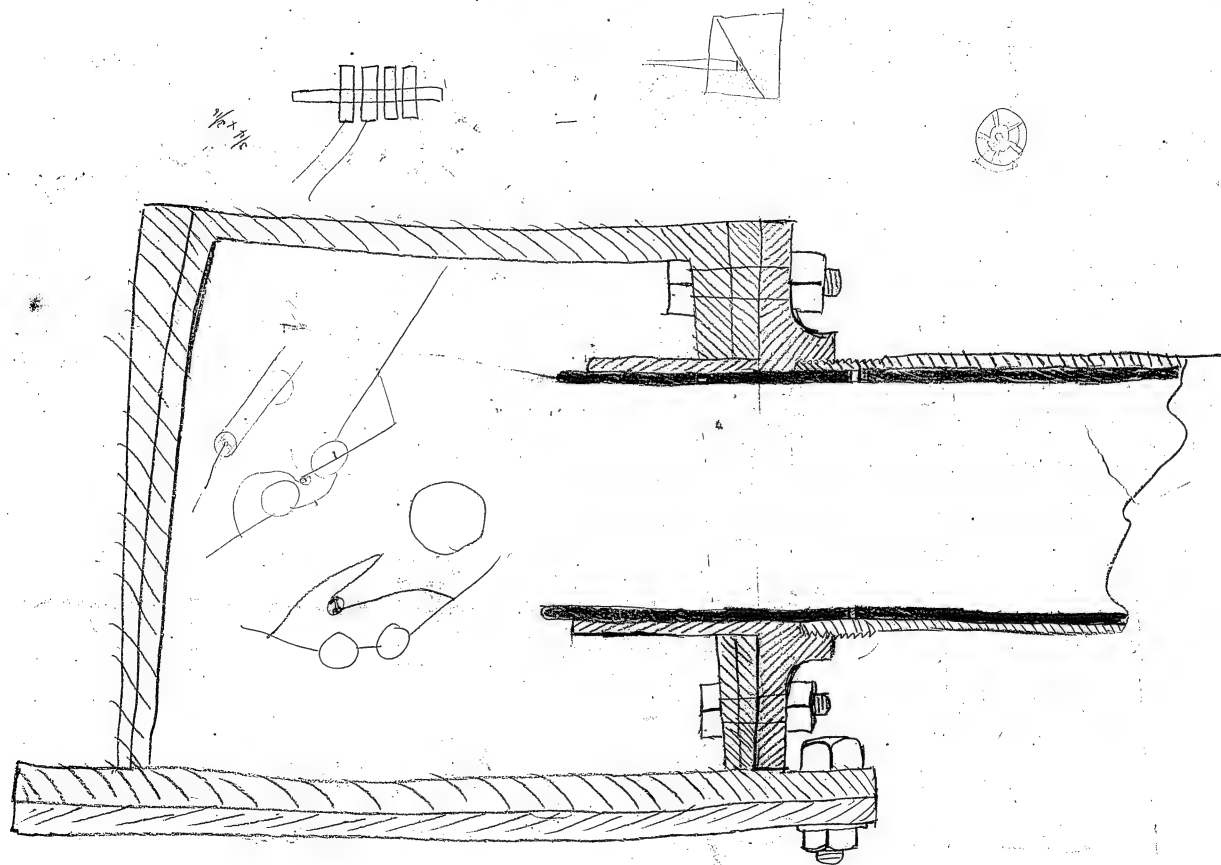
This is the second Dynamometer
we made
the other drawings
will give data



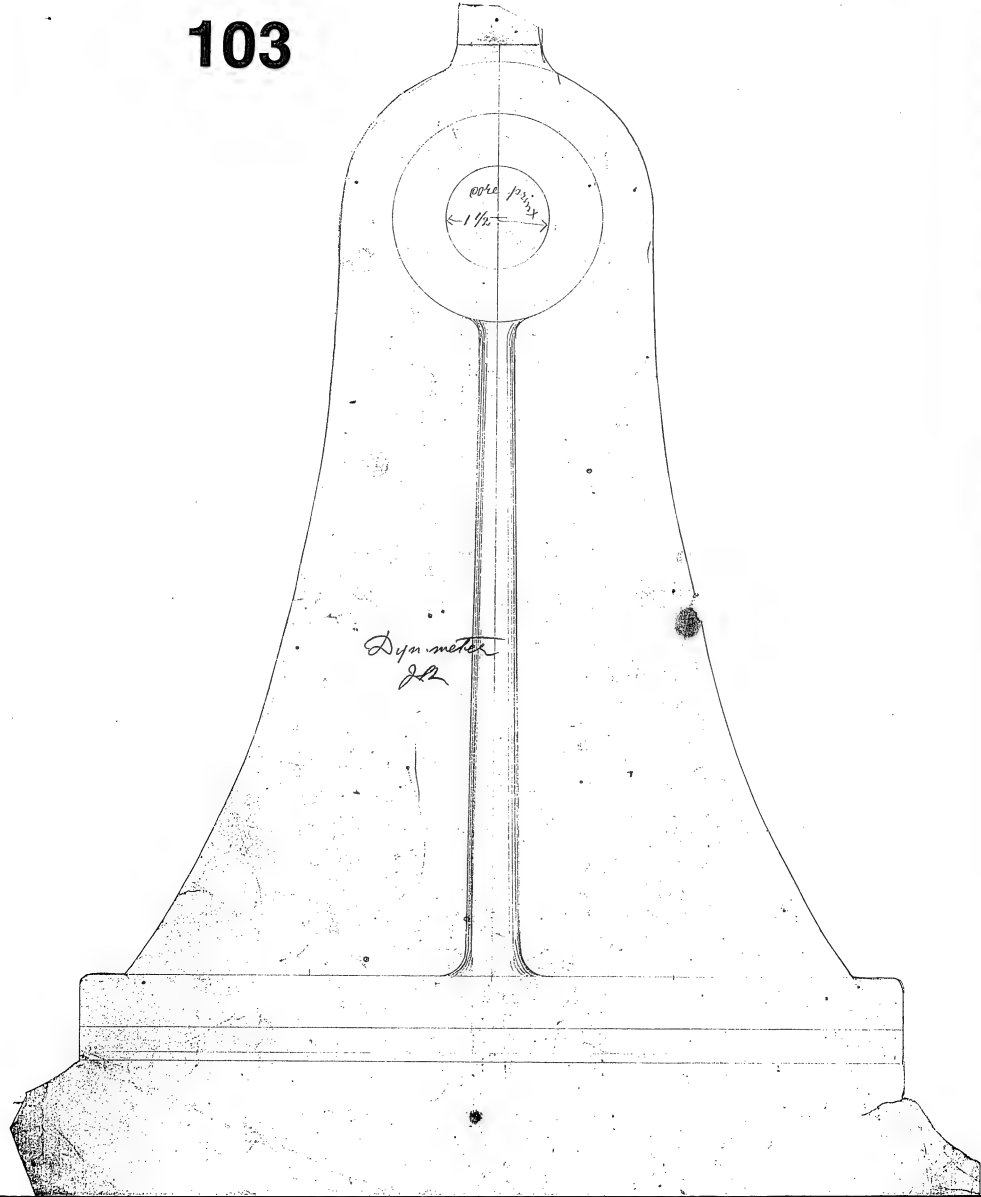
2.5
2.25
3.6



102



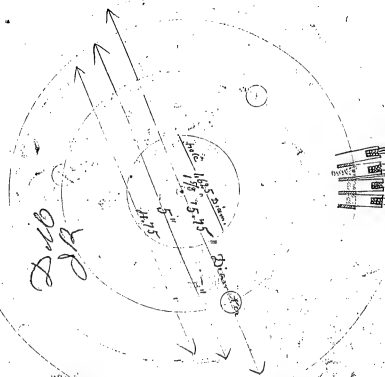
103



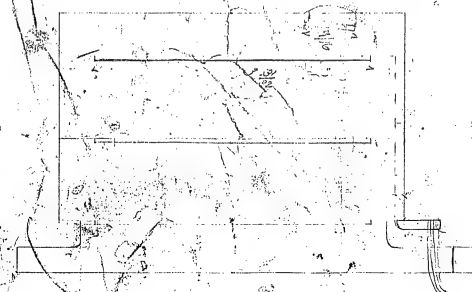
104

3.14
75.9.0

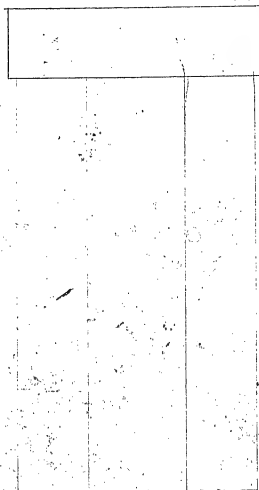
3.14
75.9.0



Not 16" Depth 0.2 miles for 8 miles road 10.55-2.1 miles
Mica 25" Depth 8.0 4. thick
Boulder 10-



105

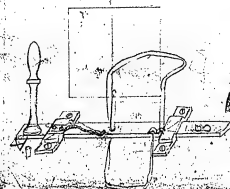
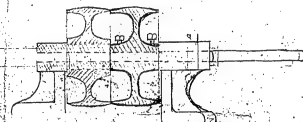
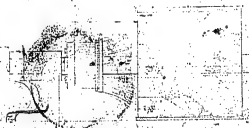
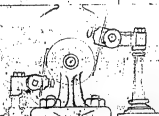


CR

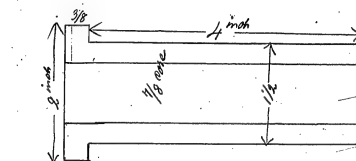
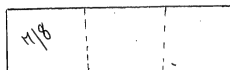
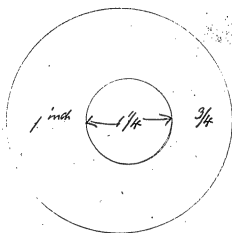
LK



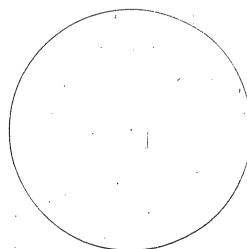
1/1
C. H. H.



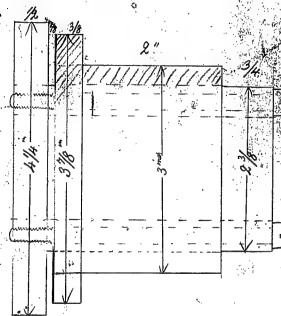
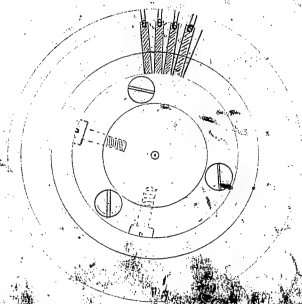
106



*Full
LP*



107

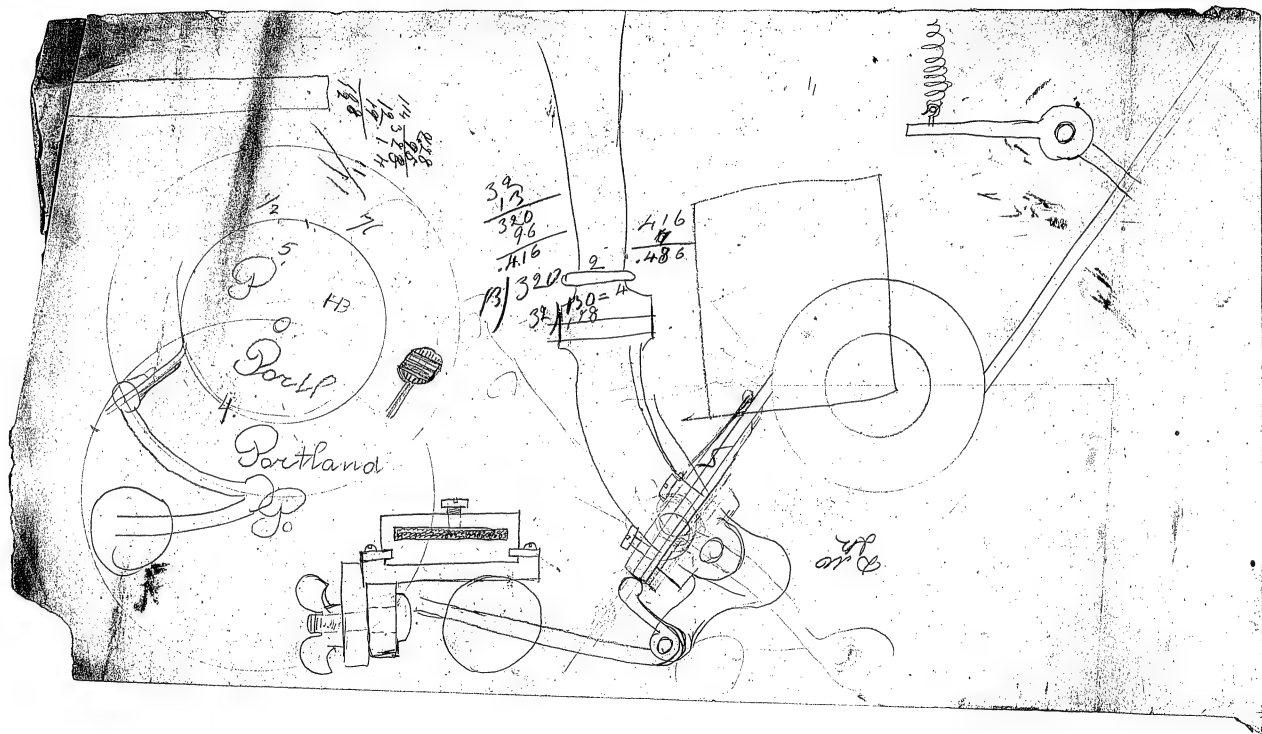


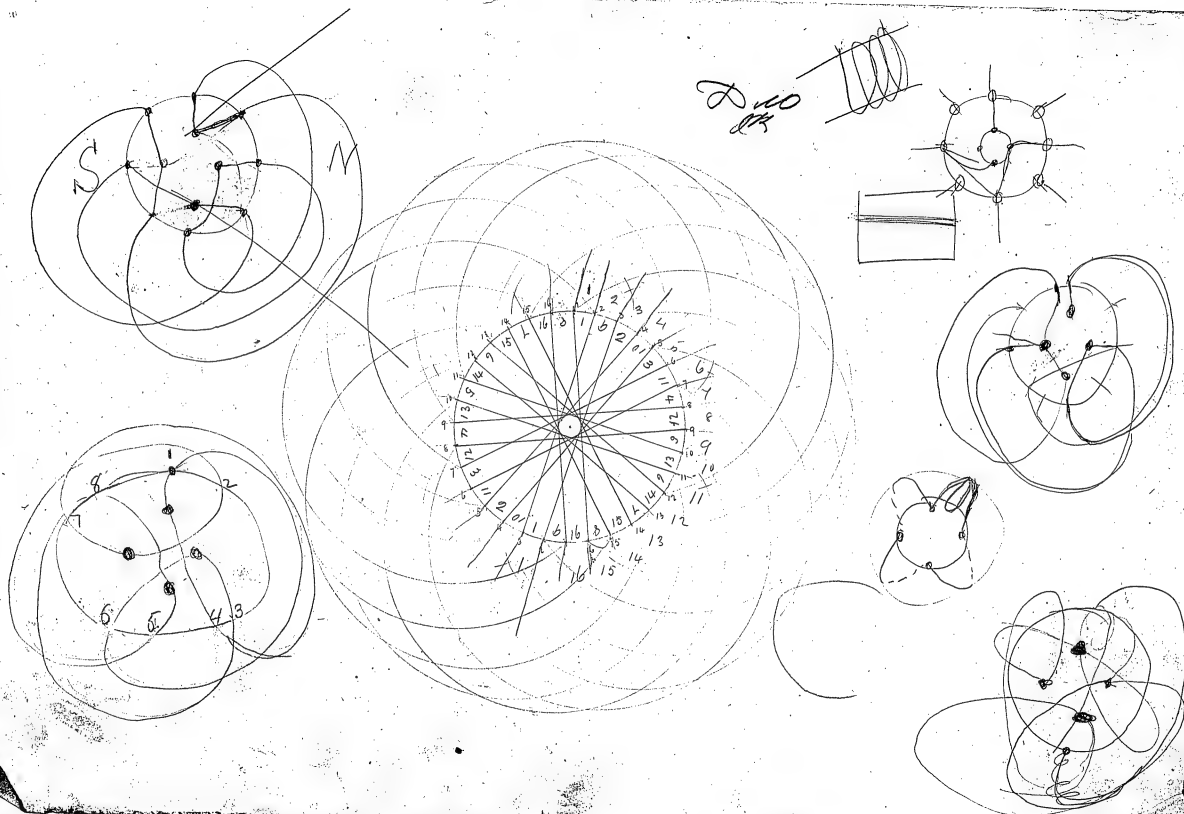
D. 10
JH

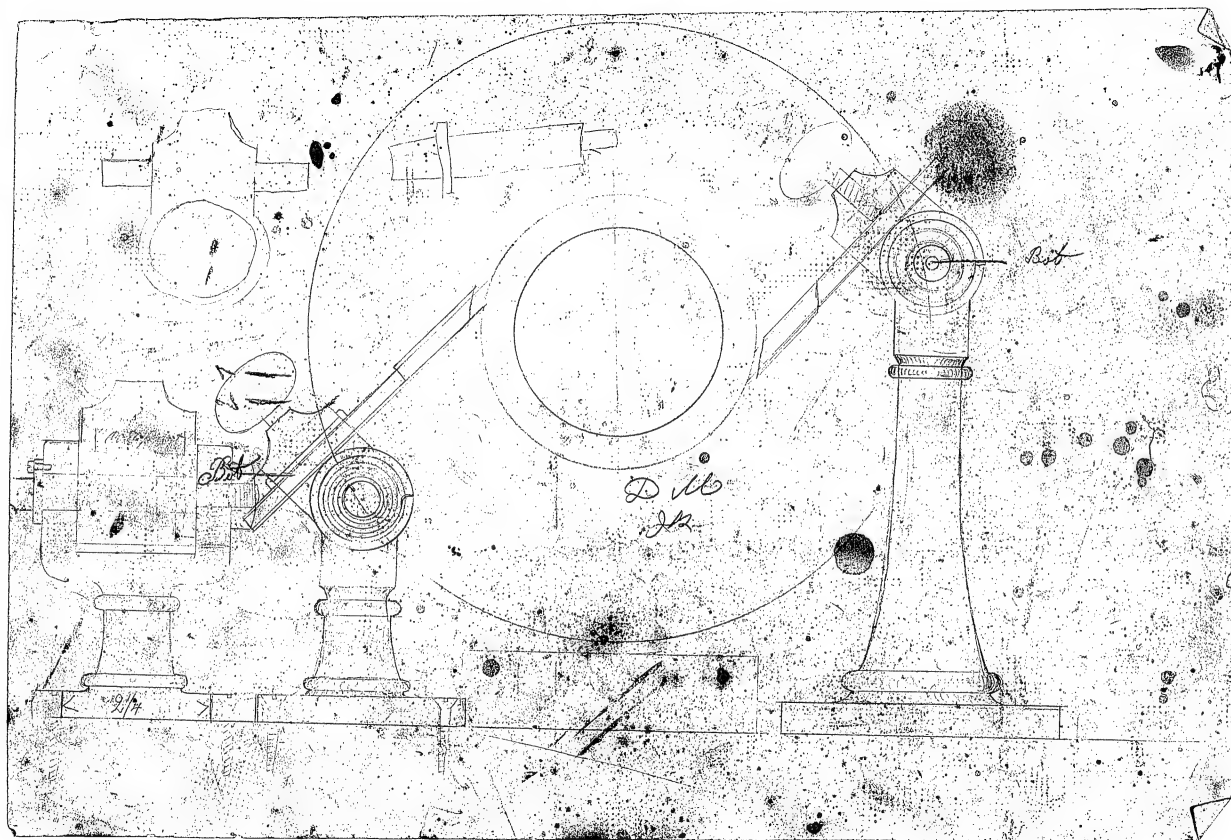
55-
20
14.20

12.5

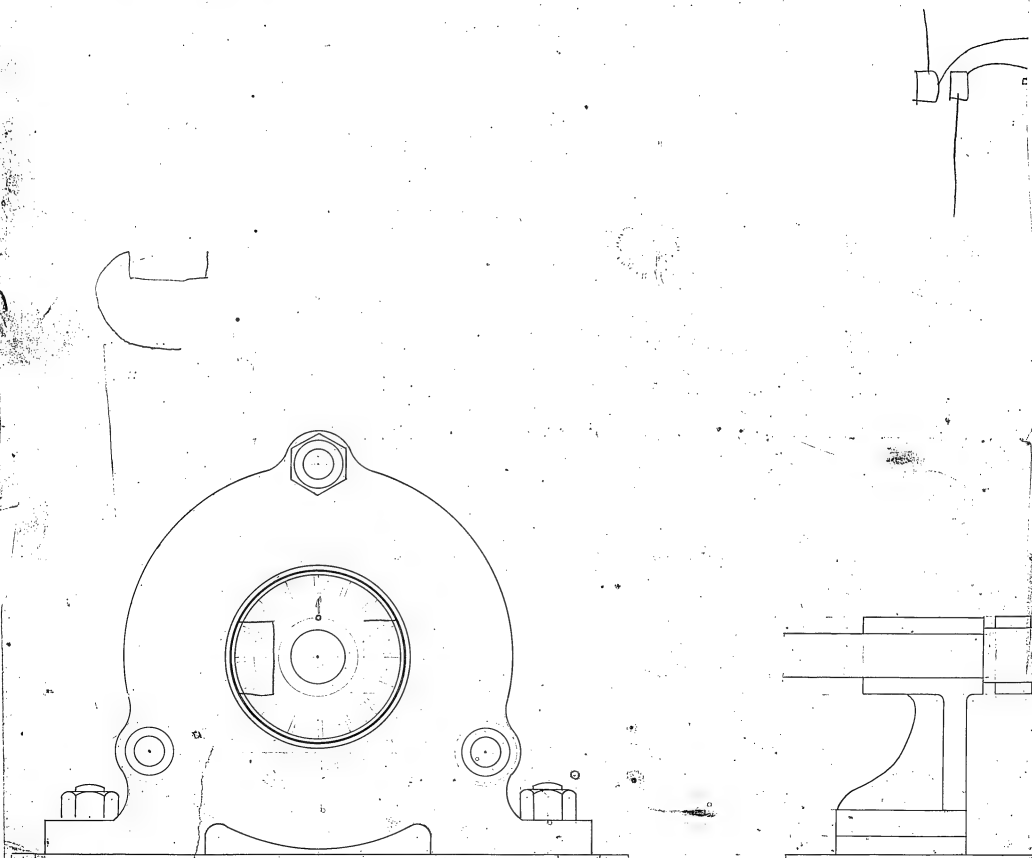
1.5

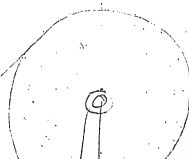
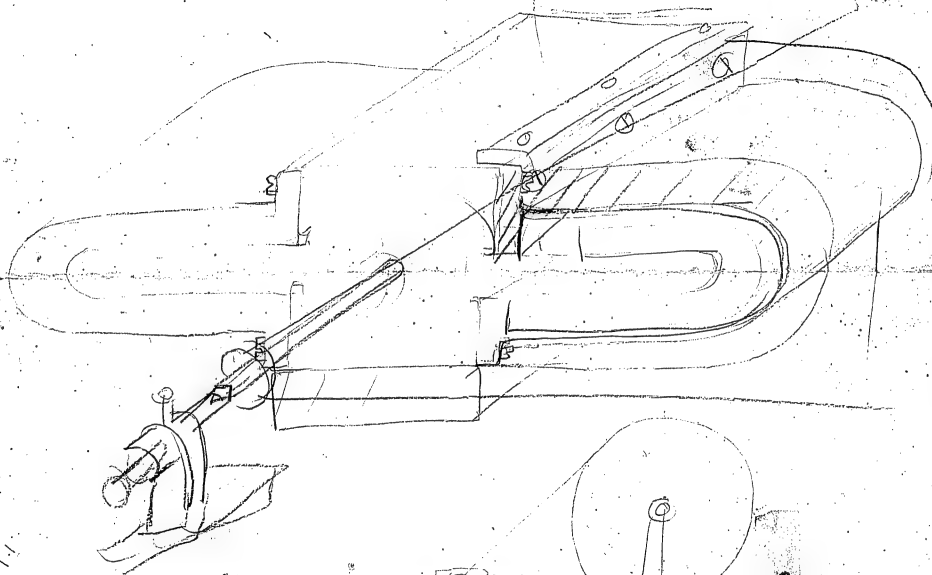
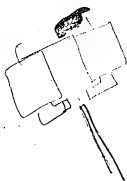






112





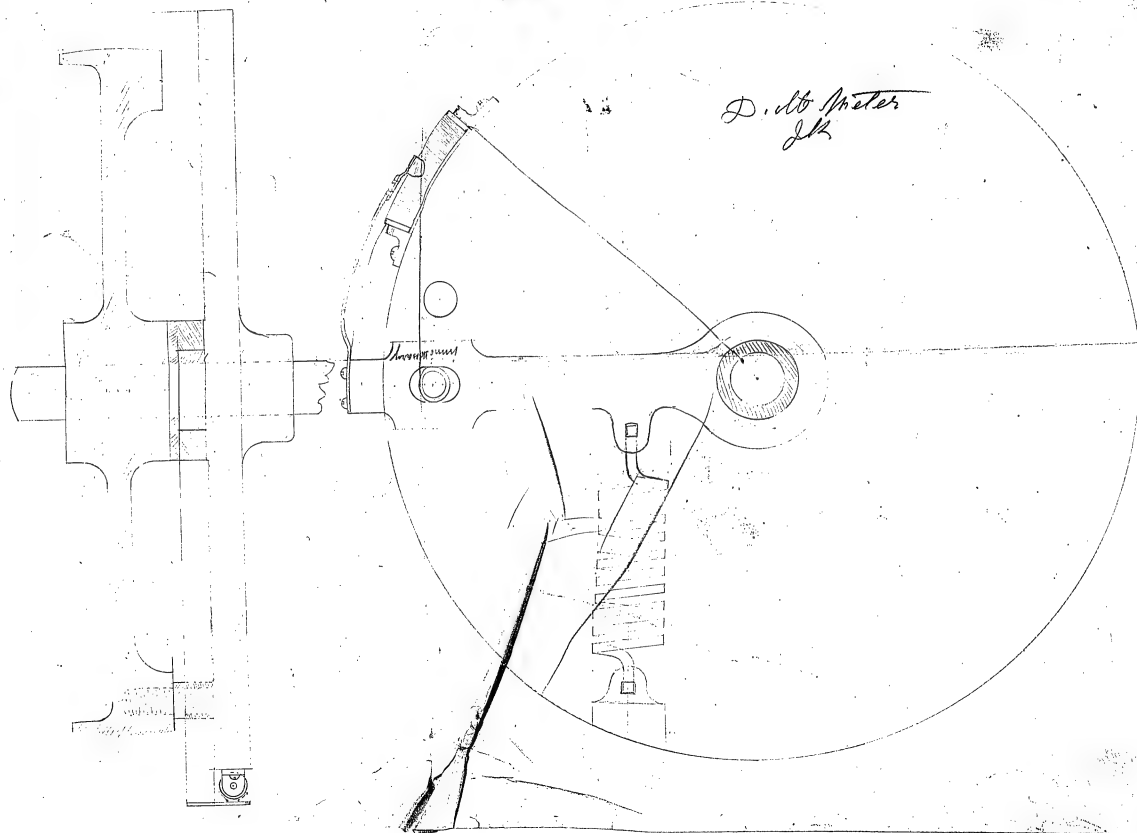
12 Daniel

Handwritten calculations:

$$\begin{array}{r} 44 \frac{1}{2} \\ 60 \overline{) 2640} \\ \underline{2640} \\ 0 \end{array}$$
$$\begin{array}{r} 3 \\ 2640 \overline{) 7920} \\ \underline{7920} \\ 0 \end{array}$$
$$\begin{array}{r} 3 \\ 3432 \overline{) 10296} \\ \underline{10296} \\ 0 \end{array}$$
$$\begin{array}{r} 2640 \\ \times 150 \\ \hline 13200 \\ 26400 \\ \hline 396000 \end{array}$$
 $\frac{1}{2}$

113

*D. to Meter
Jk*



113

8 5/8 x M
194 x 34

///

over

11/11/11

11

0

1

11

11

11

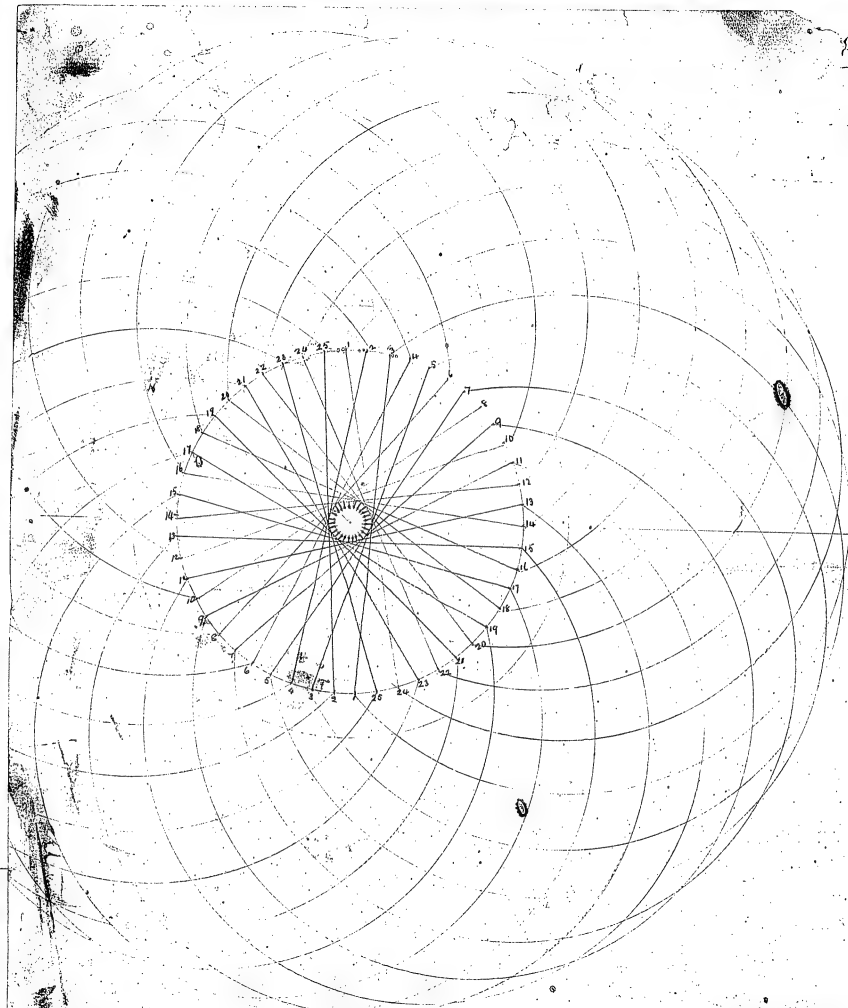
11

11

11

11

114



115

Dynamometer
JL

004
0125
0125

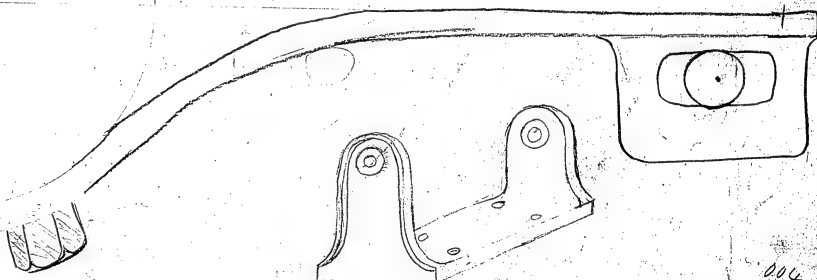
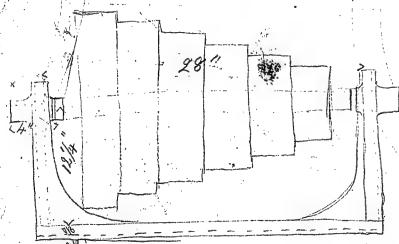
514 36
004
0072 36
0315 6
045 26
574
16

45
100



8 3 inches
12

SS

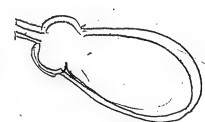
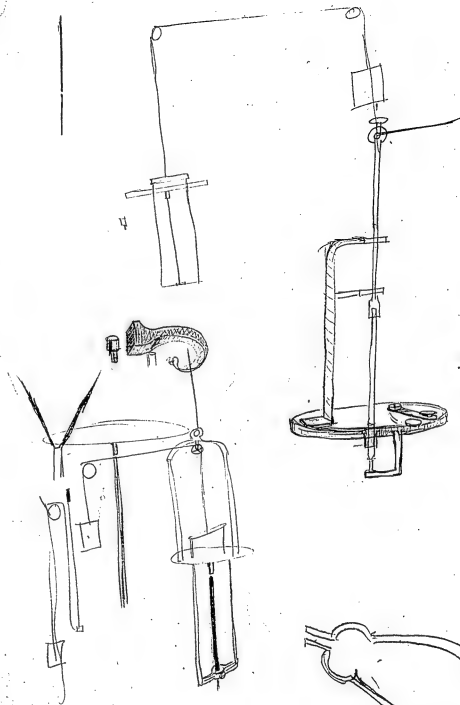
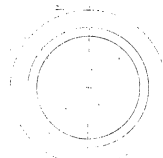


144
22
288
288
14451.68

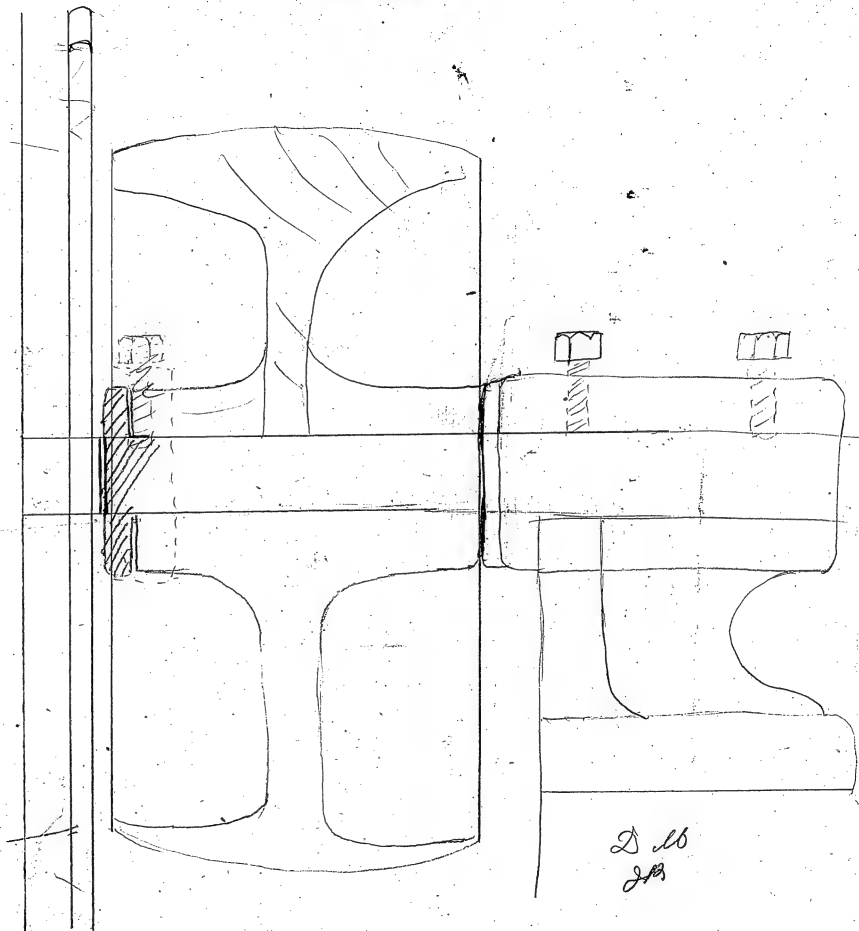
62
14416336
432
576
284

004
20061 feet per sec
155 feet per sec

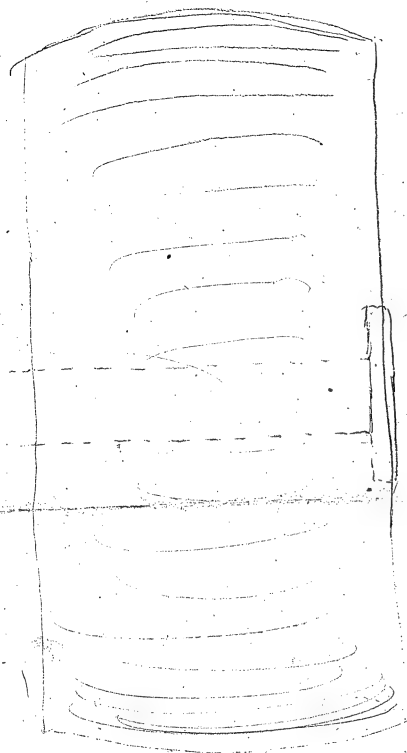
115



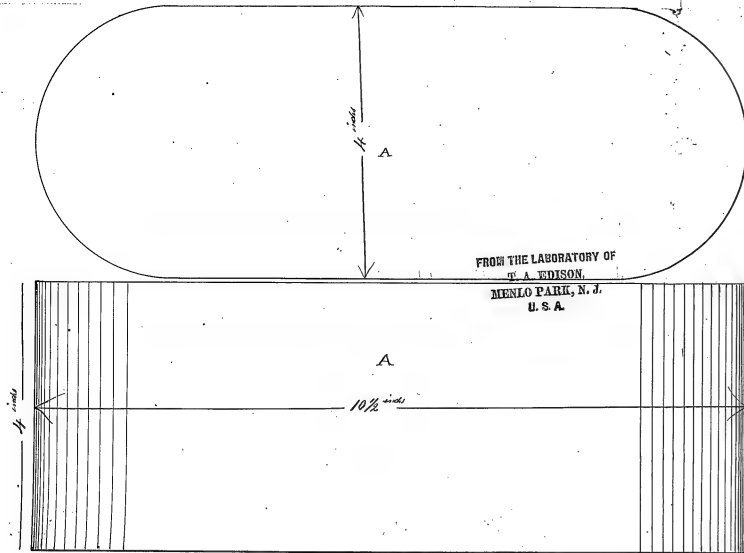
116



116

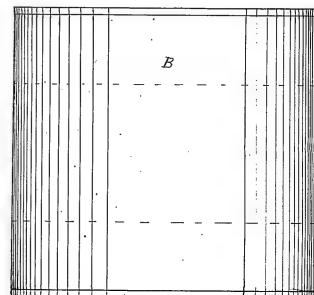
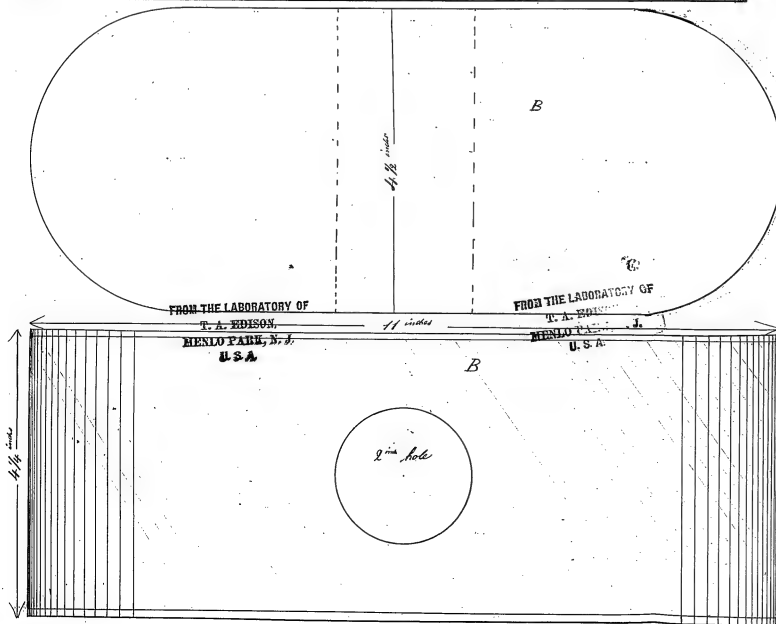
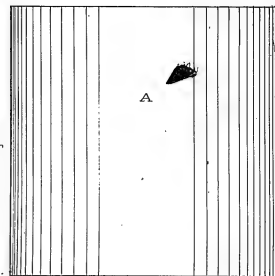


117



1 of each B size
(2) two inch hole through

Don



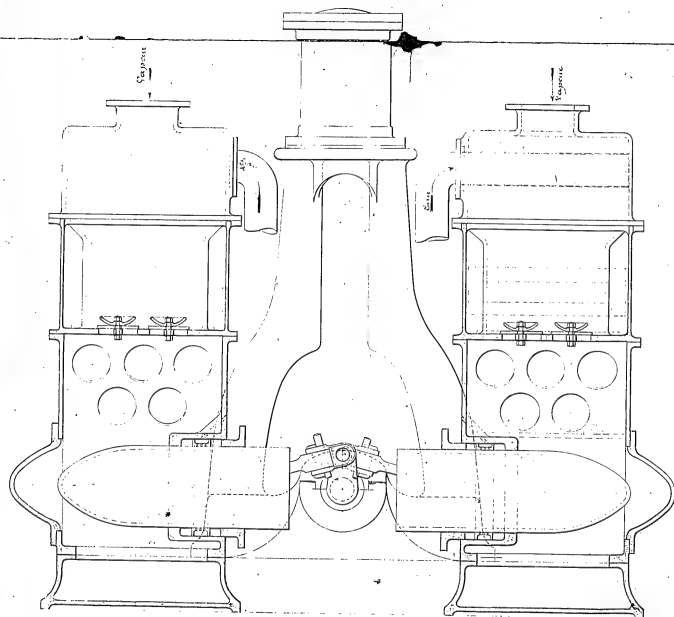
OVERSIZE DRAWINGS FROM THE CHARLES BATCHELOR COLLECTION

(Reduction Ratio = 18:1)

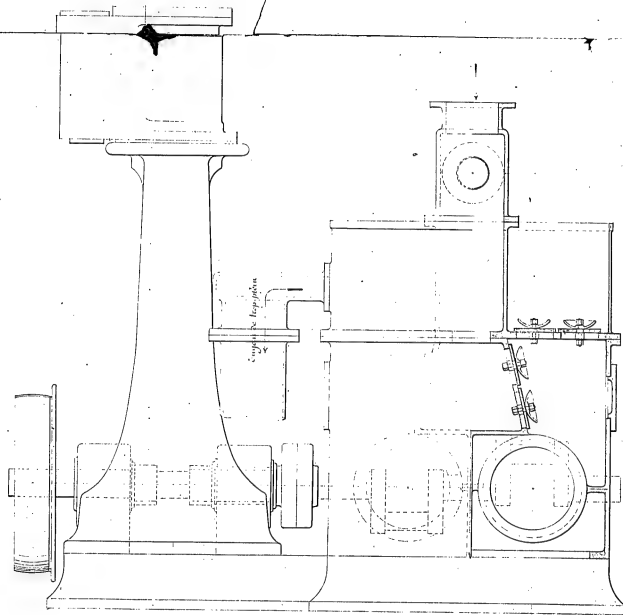
1
2

— Lumière électrique Edison —
Station centrale de 24 Dynamos de 1000 lampes.
Pompes à air pour un groupe de 6 machines.

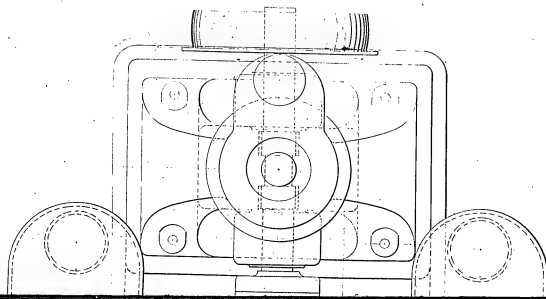
Élévation — Coupe suivant AB



Élévation — Vue de profil et Coupe suivant CD

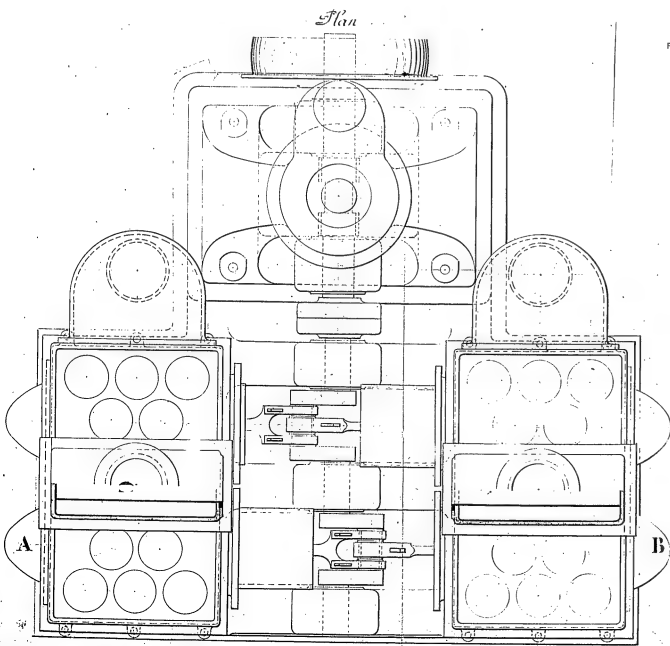
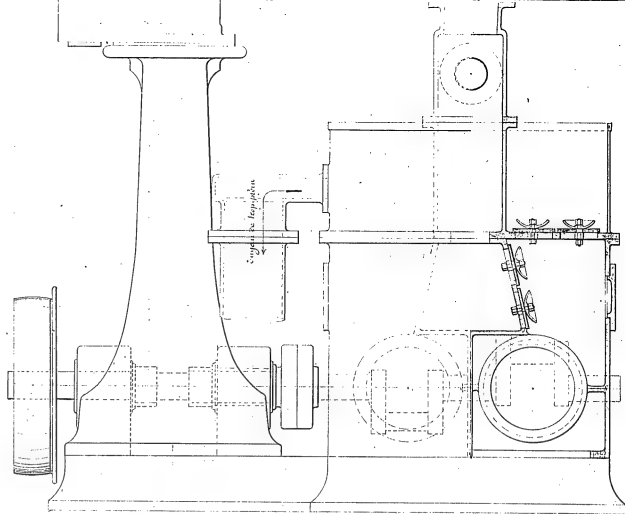
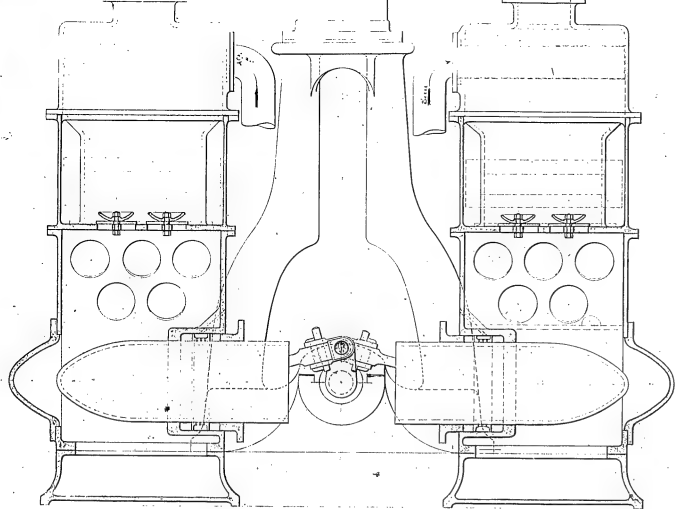


Plan

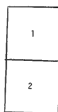


Échelle de 1/100 — 169. Kerner 1888

*Machine à vapeur
 Diamètre du cylindre 370*



FILLED IN SECTIONS



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Echelle de $\frac{1}{16}$ — 1890er 1884

Machine à vapeur

Diamètre en cylindre	370 ^{mm}
Courbe	330 ^{mm}
Nombre de tours	180

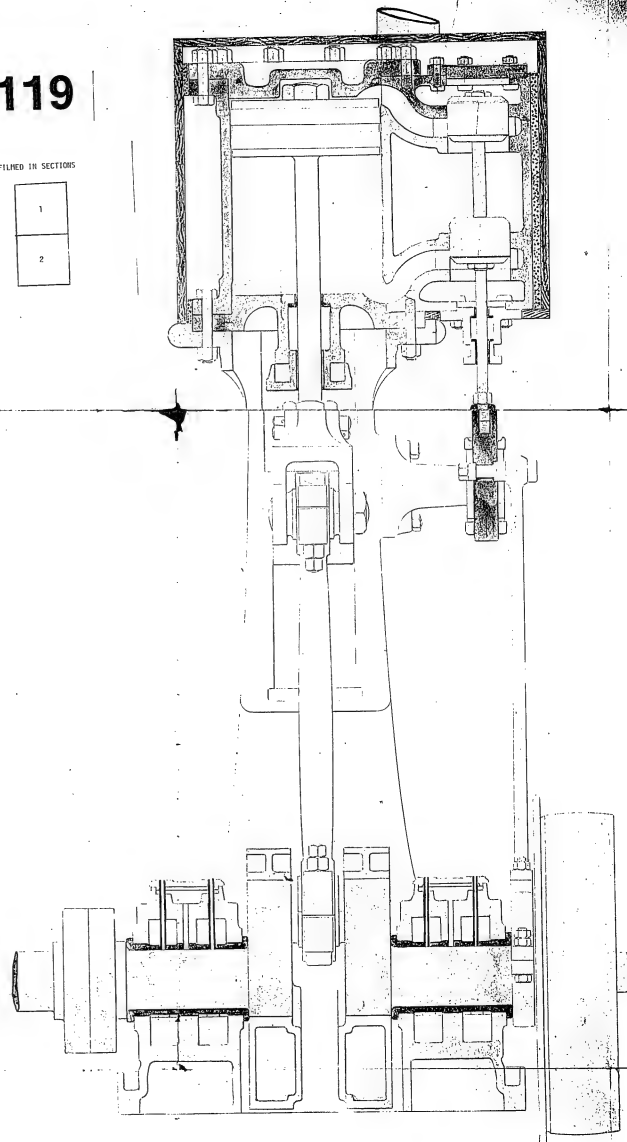
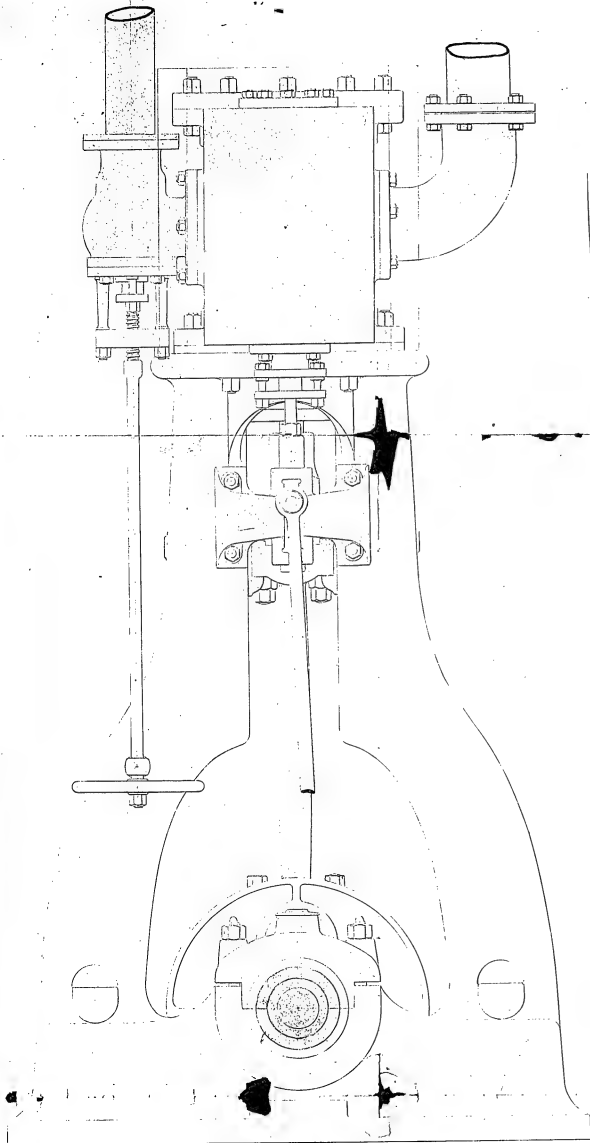
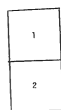
Chape à air

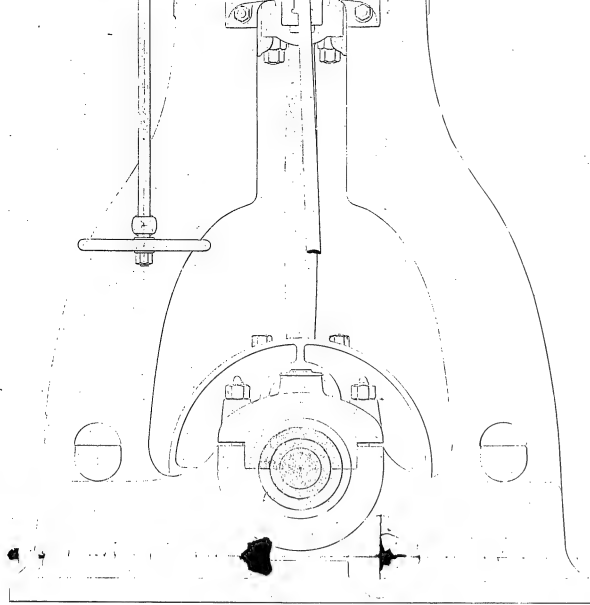
Diamètre	365 ^{mm}
Courbe	330 ^{mm}
Vitesse en tours par minute	25 ^{mm}

H. Leventis & Sarnar

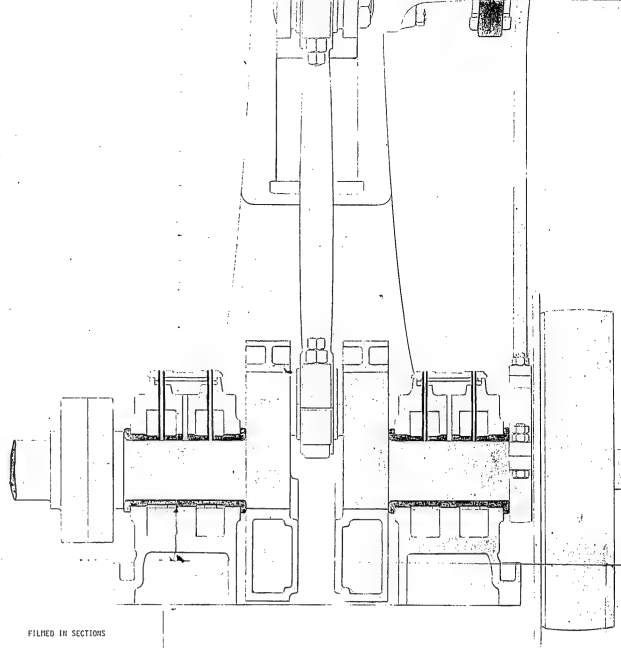
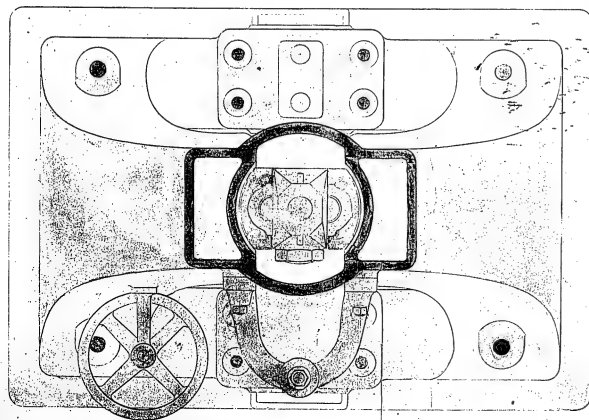
119

FILLED IN SECTIONS





119



FILMED IN SECTIONS

1
2

Machine verticale à grande vitesse — 330/370

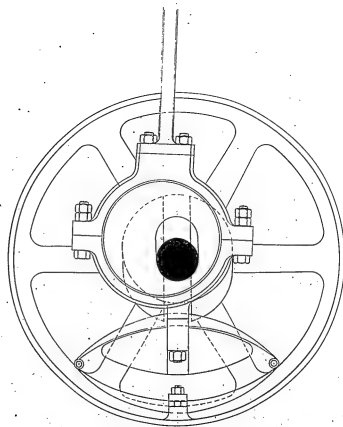
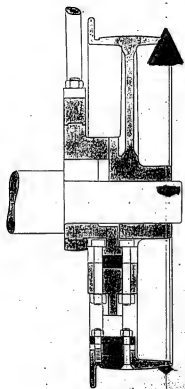
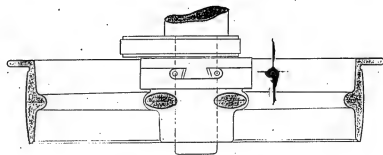
Ensemble — Echelle de 1/2

H. Lecointre & Garnier

Machine verticale à grande vitesse
H. Goulet & Sarrus

Régulateur de mouvement de détente

Echelle 1/2



UNDATED NOTES AND DRAWINGS

Most of the notes and drawings in this set are by Edison. There is also material by Charles Batchelor and other laboratory assistants. The documents relate primarily to electric lighting. Other topics include telephony, telegraphy, and electric railways.

The documents appear on the microfilm in the following order:

1. Undated notes and drawings from the Menlo Park period, ca. 1879-1881
2. Undated notes and drawings from the New York period, ca. 1882-1886
3. Undated drafts of caveats and patent applications

UNBOUND NOTES AND DRAWINGS
UNDATED, MENLO PARK PERIOD (1879-1881)

Different Buttons.

Of all substances so far tested in the telephone for increasing and decreasing the resistance of the circuit in effect of the sonorous vibrations, lampblack from the klytite hydrocarbon is the best. ~~It~~ It is very essential that the lampblack should be deposited at the lowest temperature possible ~~at which~~ that the flame of the lamp should never play upon the deposit, otherwise the product is of high resistance and unavailable for this purpose. Commercial lampblack even the best scarcely allows a current to pass through it while the lampblack & obtained by my process has scarcely any resistance. The lampblack as it comes from the burning apparatus is laid upon a white slab and those portions that have a browned tinge are picked from the pile. The remainder

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Mento Park, N. J.

T. A. EDISON

2

is ~~then~~ given ground in a mortar and then placed in a large mixed ~~substance~~ to a pressure of acetalthous and pounds. The coke this process is ~~very~~ repowdered & repressed several times. Finally it is weighed out in lots of 300 milligrams & moulded into buttons as seen in the telephone.

The reason why lampblack thus moulded is superior to any other substance is satisfactorily assumed when we consider that of all finely divided substances ~~not~~ obtained ~~even~~ by mechanical action on chemical precipitation lampblack is ~~known~~ under the microscope to have the greatest number of particles or in other words to be the most finely divided. Now it has been proven beyond cavillation that the increase and decrease of resistance of any button of finely divided

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Mento Park, N. J.

T. A. EDISON.

Subsiding matter when subjected to pressure is due entirely to the contact of a greater or lesser number of particles at the junction or surface, when thus subjected to pressure; Hence it is known that the telephone is equally sensitive to the slightest change of resistance in the circuit, hence, if a button of gas retort carbon composed of unpolished particles few in number (as compared to lampblack) is used in a telephone the production of a wave by gradually increasing pressure is obtained by the gradually increasing number of particles which are brought in contact with the surface plate, now these particles are so few & large and in many cases several particles aggregated together in the retort carbon that ~~the~~ ~~sound wave is made up of~~ ~~waves~~ the wave consisted of being pure is harsh & grating. The wave may be graphically represented

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Menlo Park, N. J.,

T. A. EDISON.

4

by a line inclined at an angle of 45° with teeth like that of a ^{hand} saw, the teeth representing the ~~unpolished~~ disturbance of the current by the effect of the particles themselves. Now if the button of gas retort carbon be replaced by one of graphite which is composed of much smaller particles with no aggregation as with the first, the wave will be pure & represented by the line as above but the teeth will be scarcely perceptible, and these gaps being 20 minutes and beyond the power of the telephone to detect hence we obtain a pure wave, but ~~for a given amount of pressure~~ these gaps make the wave as a whole by their effect on the self induction of the telephone receiver. But in the case of lampblack the particles are infinitely finer than graphite, and moreover the button is some what elastic

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Menlo Park, N. J.,

T. A. EDISON.

hence: the line ^{represents the form of the wave} ~~may be represented as~~ will be perfectly straight, although theoretically there are gaps; they are infinitely small and as compared to ~~be~~ graphical or other conducting substance, lampblack when mixed with butter has another property which no other conducting substance has and that is its elasticity, for instance if we subject buttons of different substance to pressure, the greatest degree of resilience with a given weight will be produced on ^{the} lampblack button, again if we increase the weights on all the buttons, a point will be reached where any additional weight ~~will~~ cease to reduce the resilience appreciably. Exempt in the case of the lampblack which continues to show decrease of resilience with several times the weight ^{applied} upon it that we upon the other

187
buttons,

Monlo Park, N. J.

T. A. EDISON.

Menlo Park, N. J., _____ 1887.

T. A. EDISON.

7

not be the case with the ~~existing~~ ruled
bitten,

~~Substituted~~ The elasticity of the lamp black
bitten has another advantage inasmuch
that it allows a considerable initial pressure
to be placed upon it. ~~These pressure~~ without
materially reducing its durability;
hence the apparatus is not so liable

to be thrown out of adjustment, as
those employing an inelastic bitten,
where the initial pressure must be
exceedingly light to retain its sensibility.
When adjusted in this manner a loud
sudden cause or break in the circuit or
the sounds are heard and disagreeable.
= The only defect if it may be called one
which the bitten of lamp black has
is that it is somewhat friable, but
my own experience is that if the
telephone is made in a proper manner
so that no part of it will under the

187
Effect of lessening ^{Monio Park, N. J.} hammer the
bitten that it ~~will last for~~ has lasted
for months & as far as I can see with

harness the
L. A. EDISON

8

to last as long as the instrument which
holds it, but if the instrument is so
designed that the armature is allowed
to hammer the bitten, ~~if one~~ or if the
initial pressure is very light and the
instrument receives a violent concussion
by being dropped in the floor the bitten
is liable to ~~break~~ ^{crack} but even in this case
the volume of sound is not greatly
diminished, I have attempted to harden
these bitten by mixing the black
previous to molding with sugar or tar
etc and after molding subjecting
them to ^{high} heat. This makes them hard
but inelastic, but still far superior to
any other substance.
After lamp black the best substance
is Graphite, then follow Hyposulphate of
Sod., Gas carbon, Iodide of Copper, —

T. A. EDISON.

Menlo Park, N. J., _____ 187

although theoretically there will
be alternate interruptions
practically there will be none

2
Knooded in the fingers and has the appearance
of a semi transparent wax. The solvent
power of white thymol is the greatest.
The other volatile oils have no such effect.

✓ Paper left for two weeks in a ~~weak~~
weak solution of Manganate of Soda
is completely disintegrated and when
dry ~~may be~~ may be crumbled to a fine
black powder.

✓ If a small piece of Silicon be placed
between the carbon points of an electric
light and a weight be placed upon
the upper vertical carbon, the passage
of the current will heat the Silicon
and cause the electric arc to appear.
This continues indefinitely, the Silicon
preserving the continuity of the arc ~~by~~
by its conductivity, and by its
presence as a separator of the two
Carbons. I have only tried it with
elements of high internal resistance.
Boron does not answer so well.

3
Laboratory Note

11/11/11

11/11/11

No 4

Laboratory notes -

If one of the poles of ~~each~~ a battery of 50. Bunsen cells be ~~connected~~ connected to a stout platinum wire, and the other pole connected to a series of disks of different metals to contact of the platinum wire with any one of them will give the Electric Arc. But if a condenser of 10. microfarads capacity be connected from pole to pole the electric arc cannot be obtained but in its place ~~the best~~ beautiful scintillations are obtained. These scintillations are only seen on the contact of the platinum point with the metallic disks and not on disconnecting. They ~~scintillations~~ shoot out from the point of contact like the rays of the sun and with unmovable rapidity and ~~work~~ in the case of iron reach a length of from $\frac{1}{2}$ to 20 inches. ~~The scintillations are~~ ~~shown by~~ each metal has it ~~peculiar scintillation not in color.~~ The scintillations of the different

metals are peculiar not on account of their color but on account of each metal producing scintillations of a different character & peculiar to itself. So that an alloy of several metals gives a compound discharge in which the peculiar scintillations of each metal is seen, for instance. Iron gives scintillations having the shape of a 'cigar' and are great in number, with Aluminum ^{they are} ~~thick~~ straight, and few in number and after shooting out several inches suddenly turn downward at right angles with head ~~there are~~ in enormous quantities which are as fine as the finest spider web -

No. 4.

Admiral Webb.

(DYNAMOS)
1886

If the speed of the Steam
Dynamo is 600, and the
Receiving Dynamo is of
the same dimensions & resistance

then the latter when doing no
work will run at 600, or more
exactly speaking say 595, the
lesser speed is due to the
friction of the machine, now
the maximum work we can
get from it will be when the
Receiver is running at 300
revolutions, but if the ~~resistance~~
Resistance of the Receiver

2
is changed it may be made to
revolve at 1200 revolutions
while the Steam Dynamo is
going but 600, and by adding
work until it is brought down
to a speed of 600 the maximum
will be obtained, but the
maximum work is not the
most economical it is the same
as a steam Engine there is
small economy in taking
steam to the full stroke
& getting the maximum power
of the Engine but if it
cut off early we get
the most economical work ^{which} ~~all~~
you well know, hence we only
work the Receiving Dynamo

up to 20 or 25 pc of its
capacity.

The speed of the Dynamo
like an Engine will
vary ~~as~~ speed according
to load. if there is no
governor, but the variation
of speed due to change
of load is only $\frac{1}{4}$ that
it would be in an ungoverned
Engine, owing to the law of
the square - where each
speed is required with
variable work we put on
an automatic variable
cut-off on the receiving
Dynamo & it works in a perfectly

4
analogous manner to
the ~~Steam~~ governor & ~~cut~~
Cut-off -

The Article in the Franklin
Trust Journal is not correct
in many particulars

Our device for reducing
speed we find is not
essential in your case
as we can now increase
the diameter of our
Dynamo Gabbri to such
an extent that the surface
velocity of the periphery
being the same as in a smaller
Gabbri allows of a very

5

much slower shaft
speed, and it can be
done by a couple of spur
gears -

T. A. EDISON,

7
Menlo Park, N. J.,

1880.

polarized so that with
the regular current the
lens remains unattracted
but if the ~~direction~~^{direction} of the
station reverses the direction
of the flow of the current
on the rails, the polarity is
such that the polarized
magnet is energized the lens
is attracted and the direction
of the current through the
solenoid is changed as
the water is stopped and
goes in the opposite direction
~~A reverse reversal of the~~
~~current will not alter the~~
The water always goes in one
direction independent of the
direction of the current, only
the reversal of one magnet
in relation to the other

magnet alters the direction of rotation; thus I am enabled to move train back and forward from the station without any person being on the train. To the visitors a number of cars may be attracted ~~and~~ as in the ordinary way, magnets or hand brakes may be attracted to these cars and worked by a current derived from the track, the train may be also lighted from derivations or multiple arc circuits across the track,

T. A. EDISON,

9.

Menlo Park, N. J.,

1880.

for crossing trains at the stations

8. Certain kinds of tissue paper if cut in strips and laid upon the palm of the hand, will curl and uncurl at regular intervals for hours, ^{but} on the hands of some persons it cannot be made to ~~curl~~ ^{do so} at all, now matter how often they ~~endeavor to make it do so~~ ^{attempt to make} =

9. ^{many} Nearly all bottles containing substances in solution show upon their sides ^{placed} nearest to the wall, a ~~bow~~ of least exposed to the light, a bow running from the surface of the liquid on one side nearly to the cork and thence to the surface of the liquid on the other side. This bow is composed of small drops of liquid = The smaller the amount of liquid the higher the bow, which is generally sharp & well defined =

10. A 20 gramme solution of gum dextrin in 100 cc of water smells after 4 months exactly like sweet Cedar =

11. Crystals of Prolosulphide of Barium which only in that part of the bottle receiving the greatest amount of light =

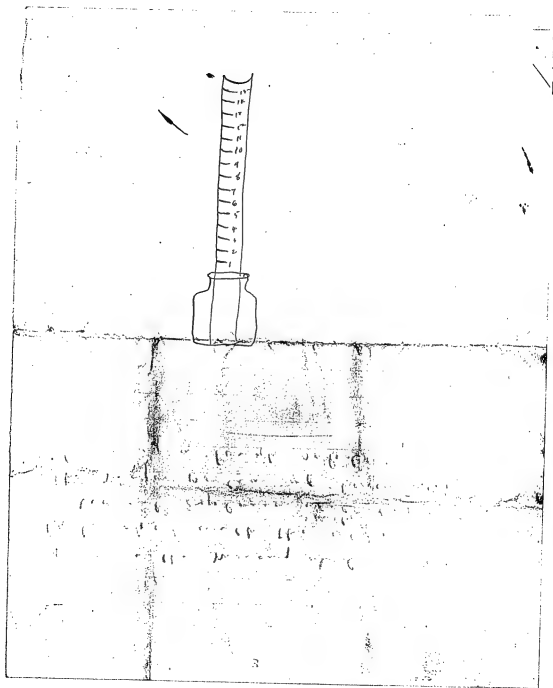
12. The smoke from the burning of Cauphon, ^{when inhaled} has
a powerful effect on the lungs ~~if inhaled~~
causing spitting of blood. ~~The effect~~ ^{the} ~~is~~ ^{is} caused
Maripainful ~~action~~ ^{Chalk} Sulphur
Acid Chloride of Bromine ~~etc~~ etc

13. ~~If~~ Nitrobenzole is a good solvent for in tra-cellulose,
^{or soluble in Cotton}
^{like It.}

14. B. Sulphide of Carbon. ~~act~~ ^{instantly} kills
~~all~~ every kind of insect which I have been
able to procure; The Colorado Beetle
which seem proof against the most
~~powerful~~ corrosive chemicals is
~~instantly~~ killed by it. Its vapor
acts as well. ^{Perhaps} they are frozen by
the cold produced with rapid evaporation
but either does not have the same effect

¹⁴
~~14~~ If a small quantity of mercury be
placed in a shallow dish and
open of ~~solid~~ metallic Sodium
be placed in the ~~mercury~~ ^{quite a}
heavy agitation of the surface
of the mercury will take place
if now one pole of a Bunsen cell.

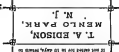
placed in the mercury and the Sodium
 be touched with the other a
 a Violent Explosion ^{instantly} ~~will~~ takes place.
 the major portion of the whale,
 leaving a tough solid substance.



3 ounces zinc dissolved to make 1 Cubic foot Hydrogen
Roughly 1 lb. Zinc in battery equals 5 feet gas or
one gas pt. per hour. Cost to the Gas Co $\frac{1}{2}$ cent
Cost in battery for Zinc, 9 cents, chromic acid —

Etc -

5 grammes of Venus Super
 1 gram Carotia Patash
 100 cc H₂O. with strips of
 paper immersed and ^{white} ^{crystalline}
 few w.c.c. deposit ^{white}
 Crystals on the paper in bottom
 of bottle = these crystals when
 Agitated in fingers are
 sticky or gummy =

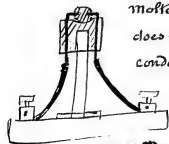


	Time	5	20	100	400	1600
Lump Block						
Hydrogenated						
Indulin Carbon						
Graphite						
Gas Carbon						
Platinum Block						

Electric Light - Sketches & Notes Experiments

Fuse equal quantities of carbon + Silicon with Ott. pipe
 (powdered) = test resistance =

Gramme machine, Platinum wire - 0.20 covered with
 something that don't combine with platinum, put it on
 thick - bake, and then weigh - keep incandescent
 all day. weigh every 3 hours = then break
 off covering weigh + gauge + look at under micro =



Molten non-volatile compound that
does not combine with platinum and
conducts - when liquid

Try aluminum Electrode in
the Induction Coil also Zn
also magnesium

7 feet

1896

In making contact between finely divided conducting material
clavi frosted (platinum or platinum with myriads of points, for instance
as in electrodeposition -

Better design

Brush handle held by frusto

Brush holders must have

better more solid design and
with spring and adjusting screw

Try building them together
with plaster Paris

Brushes on R

made thinner so it would

stand out more than 3/4 x 1/2

perhaps even all the way

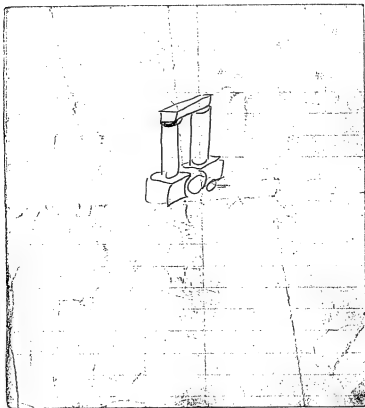
brushes would uncover

ask Dean to make a

with those 5 and then

Broden -

try different materials



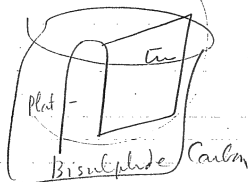
Cyanide Silver gives Cy below red
without fusion or melting. CoHCl_2 Cy Ag
some Valalys etc.

Chl Zone keeps melted
up to 700 Fahr without
emitting incense
amount of fumes etc
generally employed to
keep object at a high
temperature by Carbonizing

Its absorbs Aluminum freely
perhaps could use it in vac

~~Zone for bottle balls with~~

These experiments
 require a long & thin leaf of
~~gold~~ ~~the metal~~, or better
 platinum, then roll it into a helix
 a long & thin tin foil until
 the surface of the leaf
 is almost equal to the
 surface of the platinum



In my battery app.
 at Spark -

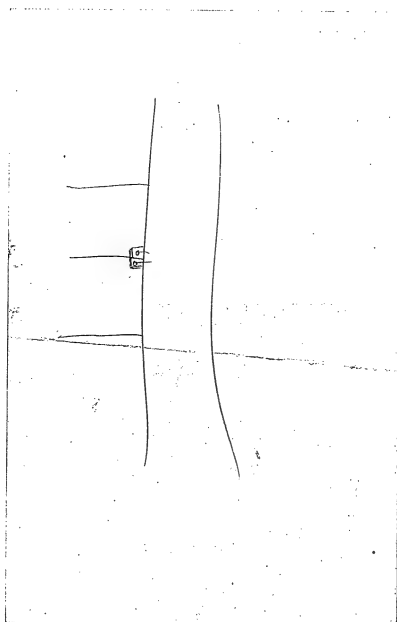
T. A. EDISON,

Menlo Park, N. J., _____ 1880.

10X12

Length, Cylinder 20 (long overall,
guide bar & cross head) - 25 - inch
6st Cylinder & guide bars 10 inches
~~to guide~~ 18" Center shaft,
beyond Center shaft 18 inches.

width, center line Cylinder
to bearing 4 1/2 inches bearing
10 inches - to

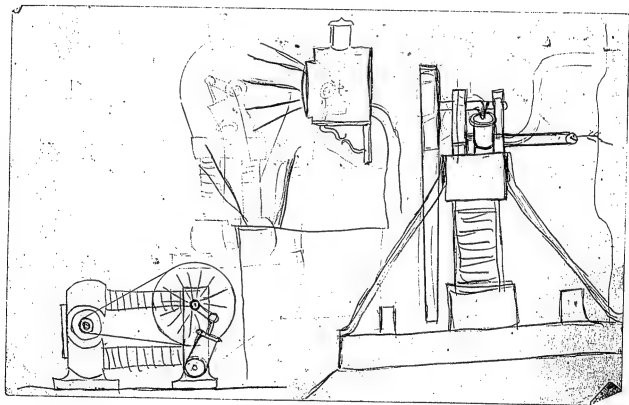


20

T. A. EDISON,

Menlo Park, N. J., 1880.

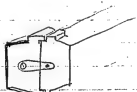
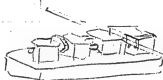
Will make a printed off drawing
of the new method of Carbonizing
I will give you the drawings
of the furnace the flask the
chamber with gas pipes & an blast
also of the plates with the slots
in where the fibres are placed
for carbonizing -



T. A. EDISON,

Menlo Park, N. J., 1880.

Mott.
Make patent of drawing for
the new method of cutting fibres that
Jim is using

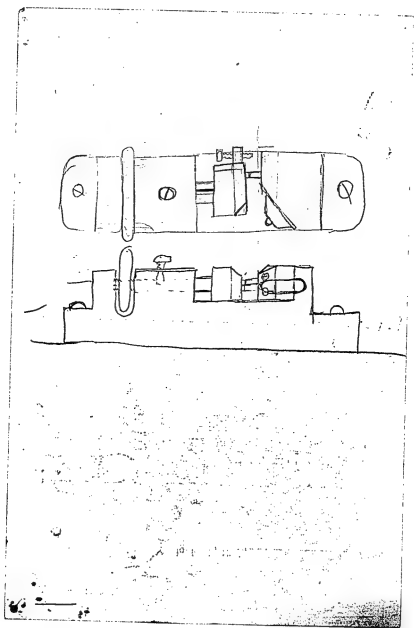


This
Top to finish



bottom to get a flat surface

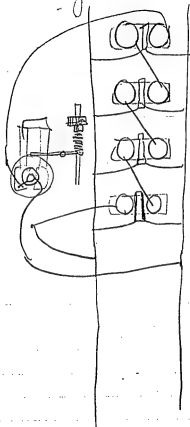




T. A. EDISON,

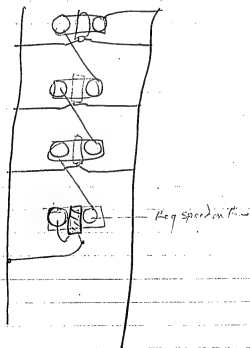
Menlo Park, N. J., _____ 1880.

Regulating



T. A. EDISON,

Menlo Park, N. J., _____ 1880.



T. A. EDISON,

Menlo Park, N. J., 1880.

heating an organic
Salt of Lead.

Throw down finely divided
Metallic lead by
immersing metallic iron
or Zinc in a solution
Carbon in a second
Salt such as the
acetate of lead

Depositing finely divided
metallic lead by
Electrolysis of the acetate of lead
with lead plates

T. A. EDISON,

Menlo Park, N. J., 1880.

Carbonization Compt R XXXII. NY
1855-295

Chem review - Anal & Chem
XXIX 1825 426 (Scientist)

Sullivan Jnl XLII 1842 seen
71 74 = Chenet

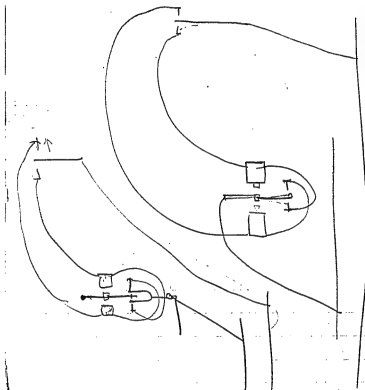
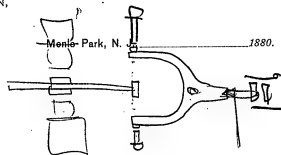
Annual Chem ^{4th year} (Reports on Chemistry) NY
XLII 1802-121

Ann & Chem I 1816 16-
Carbon

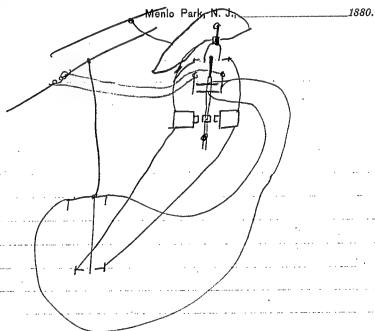
Compt R XXXVII ^(P) 1853 369-
Deposited NY

Forney Phil Trans 1825 440 446-
Sullivan Jnl 5 1822 361 seen

T. A. EDISON,

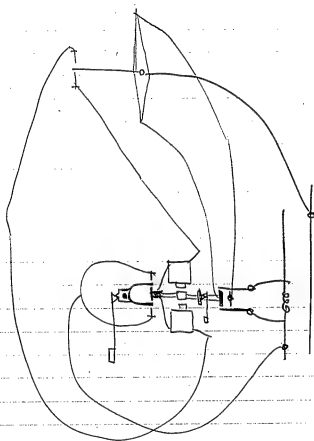


T. A. EDISON,



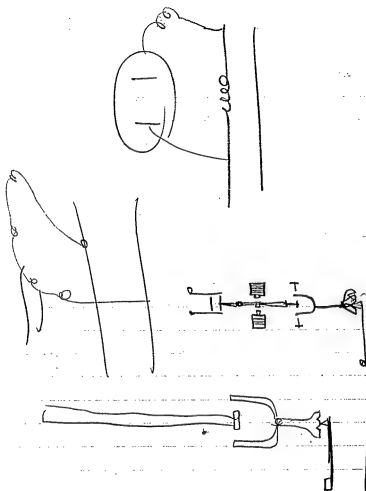
T. A. EDISON,

Menlo Park, N. J., _____ 1880.



T. A. EDISON,

Menlo Park, N. J., 1880.



T. A. EDISON,

Menlo Park, N. J., 1880.

1 lb Copper	30
1 lb Vtral	12
Glass jar	50
Top with Salt	75
Beam	35
Hangers in Cup	25
Pendulum + Control	15
bottom Contacts	20
Base	30
Extras	30
	<u>322</u>

Relay	2.00
Counter	2.00
Box for all	1.00
	<u>5.00</u>

4 1 50500.

$$\begin{array}{r} 1350 \\ 3600 \\ \hline 4950 \end{array}$$

$$\begin{array}{r} 1300 \\ 3400 \\ \hline 4700 \end{array}$$

$$\begin{array}{r} 1200 \\ 3200 \\ \hline 4400 \end{array}$$

$$\begin{array}{r} 1100 \\ 3000 \\ \hline 4100 \end{array}$$

$$\begin{array}{r} 1000 \\ 2800 \\ \hline 3800 \end{array}$$

$$\begin{array}{r} 900 \\ 2600 \\ \hline 3500 \end{array}$$

$$\begin{array}{r} 800 \\ 2400 \\ \hline 3200 \end{array}$$

$$\begin{array}{r} 700 \\ 2200 \\ \hline 2900 \end{array}$$

$$\begin{array}{r} 600 \\ 2000 \\ \hline 2600 \end{array}$$

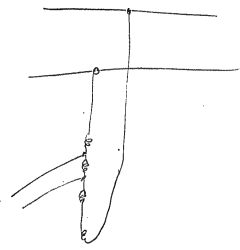
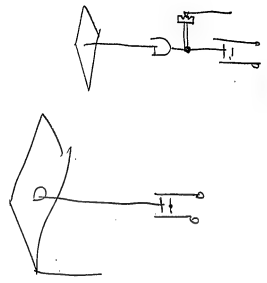
$$\begin{array}{r} 500 \\ 1800 \\ \hline 2300 \end{array}$$

$$\begin{array}{r} 400 \\ 1600 \\ \hline 2000 \end{array}$$

$$\begin{array}{r} 300 \\ 1400 \\ \hline 1700 \end{array}$$

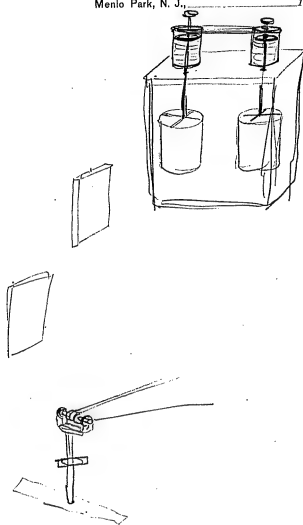
$$\begin{array}{r} 200 \\ 1200 \\ \hline 1400 \end{array}$$

$$\begin{array}{r} 100 \\ 1000 \\ \hline 1100 \end{array}$$



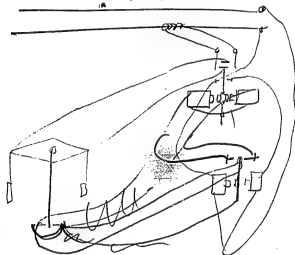
T. A. EDISON,

Menlo Park, N. J., 1880.



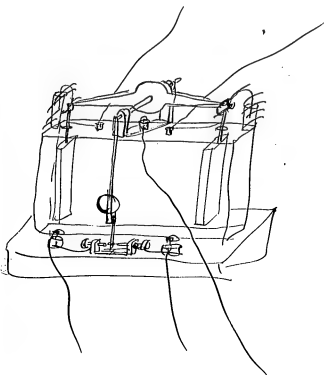
T. A. EDISON,

Menlo Park, N. J., 1880.



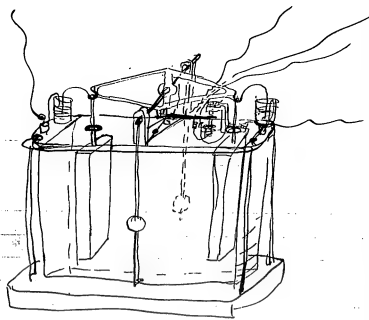
T. A. EDISON,

Menlo Park, N. J., 1880.



T. A. EDISON,

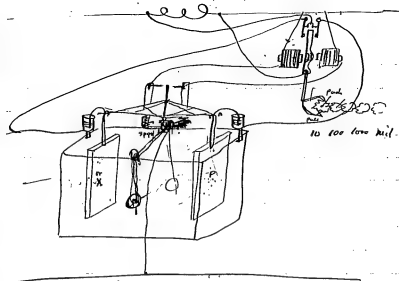
Menlo Park, N. J., 1880.



T. A. EDISON,

Menlo Park, N. J.,

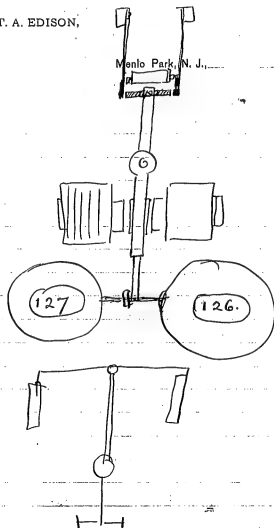
1880.



T. A. EDISON,

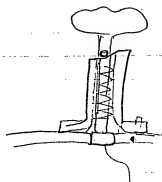
Menlo Park, N. J.,

1880.



T. A. EDISON,

Menlo Park, N. J., _____ 1880.

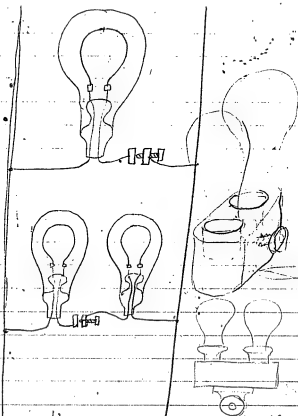


Let closer
get Complete
Socket

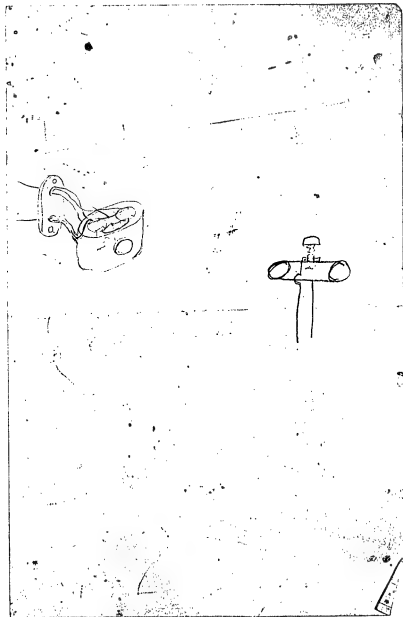
T. A. EDISON,

Menlo Park, N. J.,

1880.

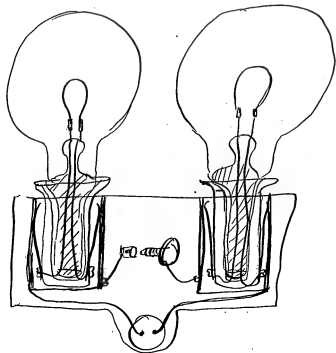


Kruigi will give you a double
holder where two lamps are put
in one socket or one bracket show
this



T. A. EDISON,

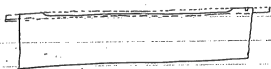
Menlo Park, N. J., 1880.



T. A. EDISON,

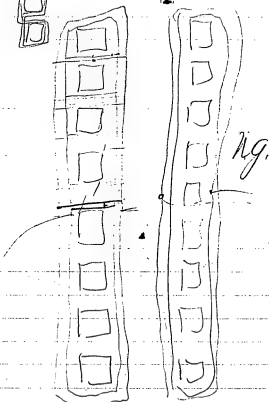
Menlo Park, N. J., 1880.

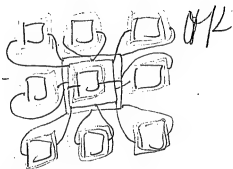
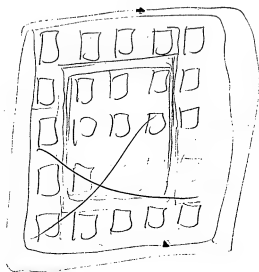
Patent.



T. A. EDISON,

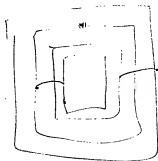
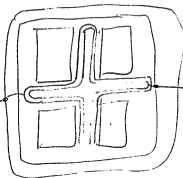
Menlo Park, N. J., _____ 1880.





T. A. EDISON,

Menlo Park, N. J., _____ 1880.



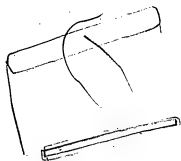
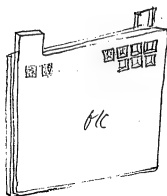
T. A. EDISON,

Menlo Park, N. J., _____ 1880.



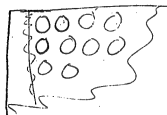
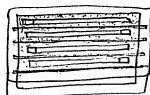
T. A. EDISON,

Menlo Park, N. J., 1880.



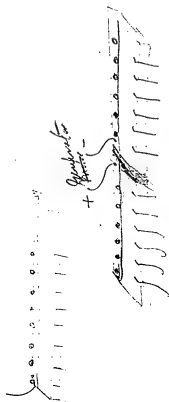
T. A. EDISON,

Menlo Park, N. J., 1880.



T. A. EDISON,

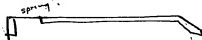
Menlo Park, N. J., 1880.



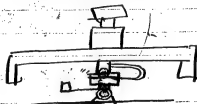
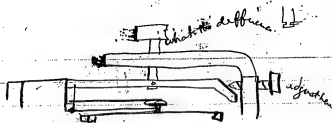
T. A. EDISON,

Menlo Park, N. J., 1880.

Note.

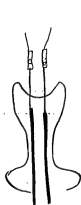


This is not a lever but a spring

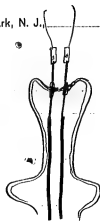


T. A. EDISON,

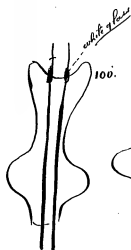
Menlo Park, N. J., 1880.



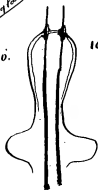
100.



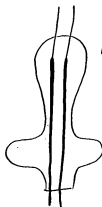
100



100.



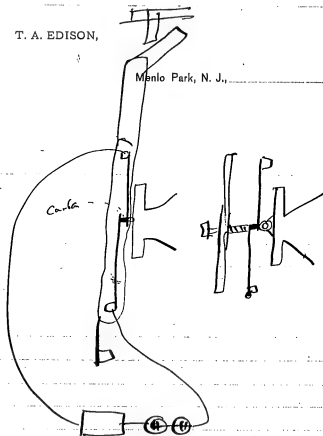
100

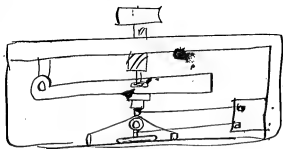


100

T. A. EDISON,

Menlo Park, N. J., 1880.





T. A. EDISON,

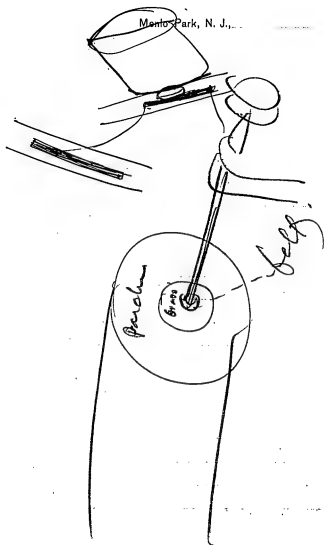
Menlo Park, N. J., 1880.



T. A. EDISON,

Menlo Park, N. J.,

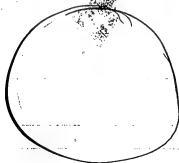
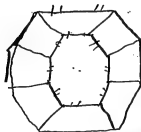
1880.

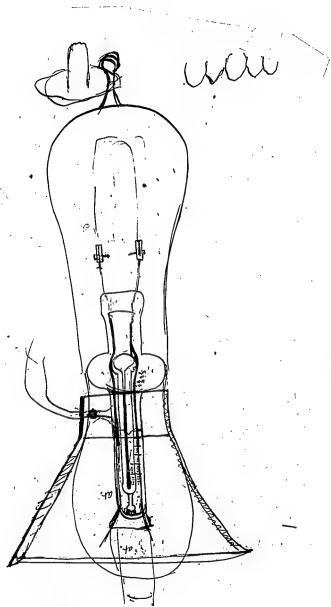


T. A. EDISON,

Menlo Park, N. J.,

1880.





Notes on New Cylinder

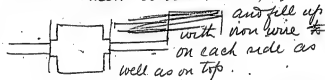
Make 49 coils of 3 layers each of

^{44 turns}

$\frac{1}{8}$ Bohn Cov. wire

Make $1\frac{1}{2}$ " shaft

Make wooden bobbin so:-



Bobbin must be permanently fastened to shaft and the rubber heads must be firmly secured to the wood.

Make the rubber heads as large that they can be cut in the depth of 3 layers

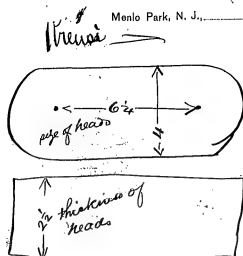
OK

JR

$$\begin{array}{r} 58 \\ 98 \\ \hline 464 \\ 522 \\ \hline 5684 \frac{1}{2} \\ \hline 22436 \end{array}$$

Wm. L. Campbell

14. *Chrysomelidae*



Thurs

The cores for the new coils must be of cast iron also the head, the cores must be 19 inches long and 3 inches thick and the head of which there are 4 must be 11 inch wide 6 1/2 between centres and 2 1/2 thick.

11 cores of these 19 in
4 heads. *(Make pattern from 13.)*

For English. -

No 13 ^{13 1/2} "Improvements in Carbons for Electric Lamps and in Means and Methods of Manufacturing the same" Made up of Amos apprais to 210, 215, 216, 219, 229, 230 and 233. -

No 14 "Improvements in Electric Lights" to 220, 227 & 228.

No 15 Improvements in Systems of Conduction for the Distribution of Electricity for Light and Motor Purposes to 255 and 256. -

T. A. EDISON,

Elec. Meter

3

Menlo Park, N. J., _____ 1880.

in the ~~upper~~ diagram. The wire W serves to short circuit the ^{arc} sparks which would otherwise ~~short~~ ^{exist} ~~spring~~ between the points T when the current was broken and also to prevent the armature with the break circuit from acting as a vibrator.

From the binding nut D ~~to~~ a small portion of the current passes through the ~~nickel~~ ^{nickel} deposition cell K , ~~where~~ which is so constructed that every unit of current passing will ~~there~~ ^{in proportion to the current flowing} deposit ~~an~~ amount of copper on a plate of copper.

1. What is a lever?

"A body movable about a fixed axis and acted on by forces is called a lever (Dr. Lewis, Qu. Helix);

Weinbach. (Crx.) 268.

"A lever is a rigid bar of wood or of metal movable about a fixed point or edge called the fulcrum; and subject to the action of two forces which tend to move it in opposite directions."

Ganot. $\frac{20}{522}$

"A beam or rod of any kind, resting at one part on a prop or axle as a centre of motion, is a lever; and it has been so called, probably because such a contrivance was first employed for lifting weights (levers, to lift masonry).

Arnot. $\frac{123}{883}$

"~~The~~ lever is a rigid given to any bar straight or curved resting on a fixed point or edge called a fulcrum."

Ganot. $\frac{20}{777}$

"A lever is a rigid rod movable about a fixed point, acted on by two or more forces, which tend to move it in opposite directions."

Weinhold $\frac{88}{848}$

1880.

Menlo Park, N. J.

T. A. EDISON.

A straight bar or knife-shaped body supported upon a fixed angular hazing, about which it can turn; two forces act on the bar on the one or the other side of the support, their equilibrium is to be studied.

Ruelleaux

$\frac{274}{622}$

The lever is a rod or bar which can turn in one plane about a point in the rod called the fulcrum.

Toothhunter Vol. 1

$\frac{75}{386}$

Lever is an inflexible bar, supported in one point, called the fulcrum or center of motion.

Nyström, $\frac{254}{341}$

The lever is an inflexible bar, by the application of which one force may balance or overcome another.

Reper.

$\frac{276}{698}$

A rigid body moving around a fixed point in itself, and acted upon by ~~two~~ opposing forces.

Oppm.

A lever is a rigid body free to be revolved around a single point; and the amount of work expended at any point in this body will be returned at any other point.

C. L. C.

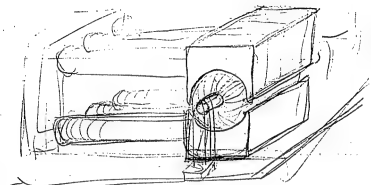
T. A. EDISON,

Menlo Park, N. J., 1880.

91-3.

120,

117.



14.

25.

30

80

5.

111

20

9

180

175

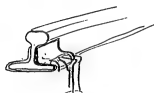
225

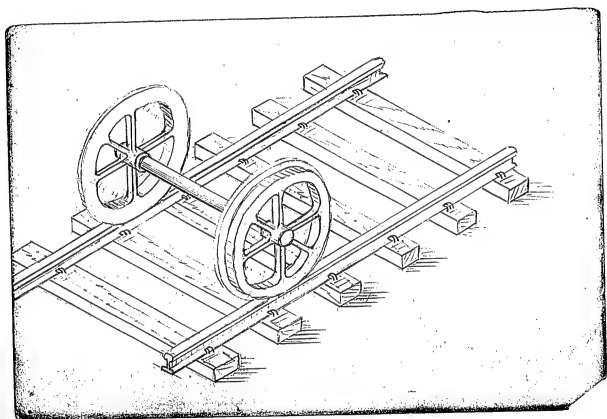
22

230

T. A. EDISON,

Menlo Park, N. J., 1880.





UNBOUND NOTES AND DRAWINGS,
UNDATED, NEW YORK PERIOD (1882-1886)

Joules table work on Motors

Remarks	Webers	Heat pounds per lb Water per Hour	Watts to lbs per Grain of Zinc	Total Zinc Grams
Motor held stiff	100	0		535.25"
" Doing work	66 $\frac{2}{3}$	18983	53	356.83
" "	50	21357	79	267.62
" "	33 $\frac{1}{3}$	18988	106.4	178.42
" "	1	845.73	815"	5.3525"

Chem News Vol 23 p 172.

or Motor duty	
53	$\frac{1}{8}$ hp duty
79	$\frac{1}{4}$ "
106.4	$\frac{3}{8}$ "
815"	$\frac{99}{100}$

Substrate for coating platinum
of inside part to fuse calc it
oxide Bismuth Bi_2O_3 - oxyd flame
melts to dark Brown

oxide Cop CuO - black globule
see if it can do -

Cryolite fuses candle

Massicot - melts to yellow gla
spreads into discharge

Pb - 89 - C $3\frac{1}{2}$ - Bi $2\frac{1}{2}$

perhaps Silica + oxide Lead alone
will fuse -

Talc - no alkali fuses on plat
melted in B blow

Amber carbonyl without melting = big
smaller carbonyl - also carbonyl of
Cnd. Carbon 100% pure

El. It. - Filaments

Carbonyl hair, heavy in strong KO, 80% - Boric acid + Linseed oil - Chl Zn

Squirt gelatin, then oil on by Tannic = yellow - pyro yellow - long thin in it
carbonyl - also strong chloroform volatile and not too soluble in water

Pyropt sand bath for Carbonyl filament - 100% - 100%

gelatin gelatin - Chinese moss

Full tube experiment - Use gelatin in chloroform - also Gelatin + Linseed oil - 80% - 100%
also some diluted Tannic - Vanillin - Choline + alcohol - Alcohol + Gelatin -
Baker in Benzene + Benzene - Soak for glycerol + water -
grainy -

(1883) over						
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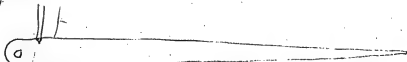
THOMAS A. EDISON,
Central Station, Construction Dep't.,
No. 65 FIFTH AVENUE.
NEW YORK.

Form M. 2-5
W. D. RICH,
SUPT OF CONSTRUCTION.

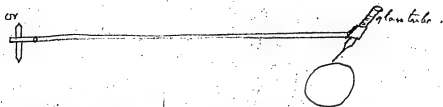
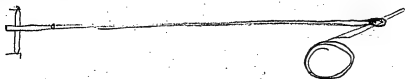
188

Address reply to _____

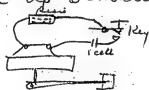
John Make that lever on the Malograph
stiff this



and about $\frac{1}{16}$ thick. while we are experimenting on the
siphon you better put in a Ladys writing pen or little
glass tube with ink (aniline ink) this



get it working yourself by using 1 cell of
battery & Key direct on Malograph,
You can test its sensitiveness by pulling in
resistance



~~OK~~

Finished

THOMAS A. EDISON,
Central Station, Construction Dep't,
No. 65 FIFTH AVENUE,
NEW YORK.

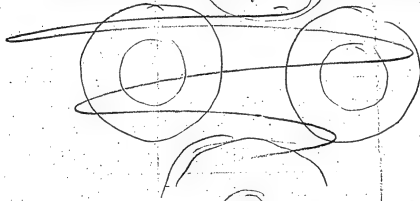
Filed: D 1886 "Electromotograph" Form No. 1-2
W. D. RICH,
SUPT OF CONSTRUCTION.
(1880?) 188

2

Address reply to

~~do not start the~~ Put a handle on
the motograph you arranged to open & close
as a handle. I will turn it by hand
plainly enough to give at a rough
test. Have it ready by 4 pm -

You must design a good motor for
running motograph. I told you
yesterday to alter a motor to close on
a platinum point but you didn't do it.
Please have this done & see you try
it on the motor that runs that little
gas lighting static machine.
I think the new motor should have
2 pair magnets like the old unusual
printer and I also say this size
no coils too large. See next page.



Finished

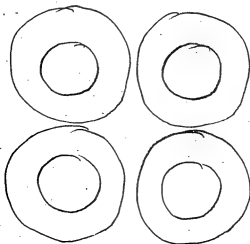
THOMAS A. EDISON,
Central Station, Construction Dep't.,
No. 65 FIFTH AVENUE,
NEW YORK.

Form No. 3-4
W. D. RICH,
SUPT OF CONSTRUCTION.

188

Address reply to.....

3



heavy armature
in fly wheel ring

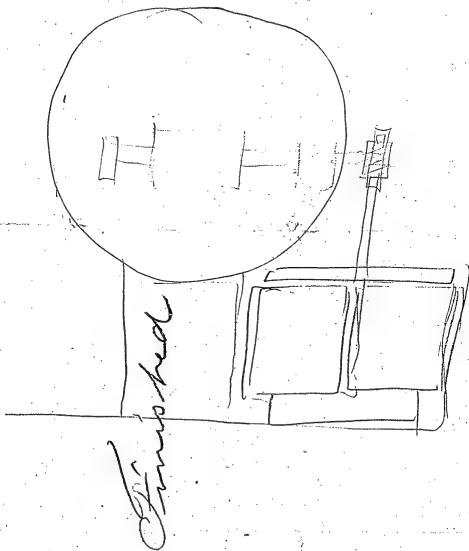
Finished

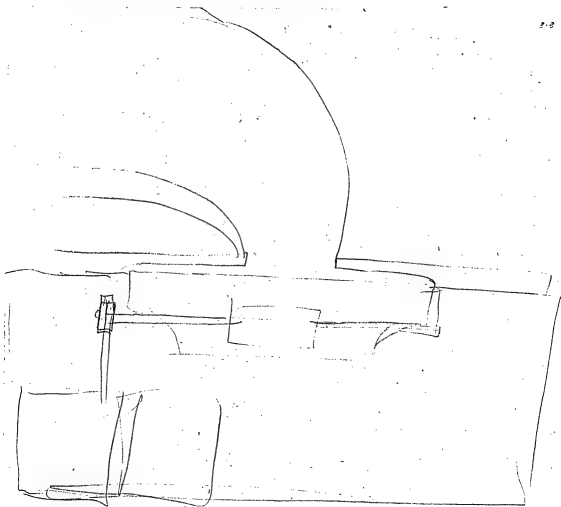
THOMAS A. EDISON,
Central Station, Construction Dep't,
No. 65 FIFTH AVENUE.
NEW YORK.

Form M.
W. D. RICH,
SUPT OF CONSTRUCTION.

188

Address reply to _____





Must have easy
way to get to Chalk -

How about that Individual Call

Telephone.
Please rig up that Repeater that didn't
speak & have 2 good transmitters put in &
get it all ready for me to test - Edison

Table of resistance of different sizes of Waller
Carbons.

Table of the number of V&B's on Waller
Carbons different sizes & the temperature
with various Weber's up from ~~the~~ a
fraction of a Weber to a temperature of
300 or 400 Fahr.

Table of maximum German silver wire
from finest to large size the amount
of Weber from temp air up to at least
300 or more Fahr. - Table must give
it in air also in air enclosed in
closed place. -

also put two wires side by side
as we use them on boxes, see diff.
also with 3 & 4 side by side -
Tabulate whole thing.

Table of temperature of the wire
on Z machine with 30 lights on for
2 hours, use three thermometers try temp
band of wire between bands of commutator

be sure brushes set at nonsparking point
Then allow it to Cool down to atmosphere
& start fresh with 150 lamps for 2 hours
then stop & note temperature in the 3
places as before =
Then cool to atmosphere, and
put 200 Lamps on & run for 2
hours - & take readings =
also see your Vatts are always
same to do this you will have
to regulate the field =

Want this very same experiment
tried with the R machine.
1st 125 Lamps 2nd 250, 3rd 375
85 more or 335 Lamps, this I believe
makes the same proportion, Tabulate
the whole thing -

~~Want the maximum~~

Table like Clarke has printed but figured out
for German Silver - But ~~later~~ Column
giving ~~length~~ Radiating surface as well as
lb ohm etc =

Table of radiating surface & resistance
for the sizes wires nearest for regulating
lamps from 16 candles to bright red.
table must give for every different number
lamps from one up to 800, greatest
heat which german silver must reach
shall not exceed temperature of the
binding wire around a K motor
with full load running 2 hours
this from experience at least has
been found. Safe =

all of George tables in meters, his
Constants =

all of Uptons Curves. except life Curves,

Table showing cost Lamp in detail -

Table of Engines different sizes, cylinder
speed, different powers at different boiler
pressures, price,

Full description Z. L. K. E + C
outline sketch with sizes to fold up in
book, must give exact distance from rim
surface of Babbin to rim surface of
field height of bare Bands around
wire from field - exact space number wire
size copper size insulation thereon, also tape
parchment paper. Exact contour of space on end
amount of wire on end to wire on straight
part, weights of everything, Cost stock. number
each stock = exact number layers in field, space
occupied = every detail,

5-

Table of Volts on L.R.Z at different speed
with 150. on L 250 on R & 60 on Z set
at non sparking point all cases, go down
as slow as $\frac{1}{2}$ their regular revolutions
& after running some time take the
reading go & then gradually
increase speed 50 or 100 revolutions
Each time, setting brushes if necessary
to get red spark note speed & volts
several times Each speed to get
a mean = then after doing this
add more than regular load
& try it - want to ascertain
the effect of the field getting more
volts as speed increases if this
don't bring up more than ~~per~~ directly
to speed = also in this experiment
take volts with no load & brushes
Set at neutral point at different
speeds = Now use a separate machine

With regulable load go all over the experiment at different speeds. Keep the field constant & get reading of volts around field.

all the safety Catch tables

Table of Krug's tubes giving exact sizes of tubes spaces, washers, rods then circular Mills Res per foot per length per mile lbs per mile radiating surface per foot length & mile, lbs per ahm weight length compound, per foot. all his tables

7

Table of h_p of any given boiler at
different pressures on Armstrong Eng -

Table of Res of different metals & alloys -
want it pretty full -

disruptive resistance of different thickness
of amorphous substances in thousandths

Curve of saturation of field magnet
all the data Audren has on
the different size fields -
+ armatures =

Table amount dep. at for various
different metals -

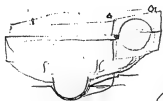
Table Res of Liquids
" " polarization

8

Table how lamp comes down in Res. as it heats
in pump = same as Howell made =

Sizes of all our lamps Radiating surface
in Milimts -

Simple rules -



ask Jean

Monthly life Curve for every Month since
we started on lamps of same size
② filament cut same size =
all on one sheet =

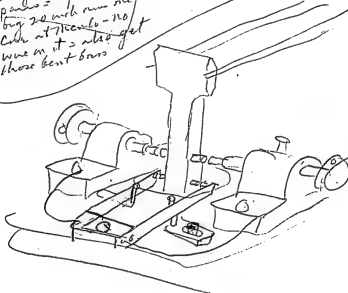


Model of

C




Small model of original
straight. but want
photo of
part - 20 inch run one
Cable at 1100 lbs - no
wire in it - also get
those bent bars



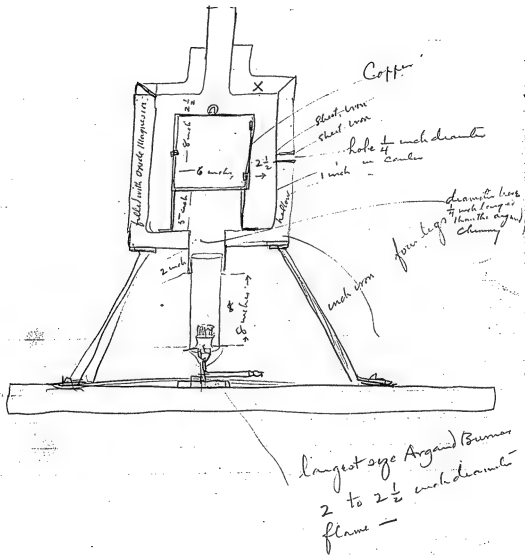
improved on pressure indicator.

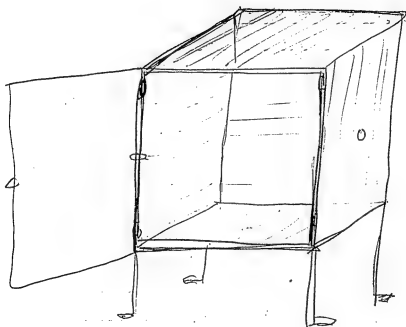
I think German steel spring or gamma
silver might be better as it's not
affected by heat like, brass -

Experiment that focuses more on
temperature of pans Machine bars etc -

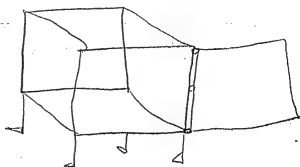
Maximum amount of volts that can
be lost ~~from~~ ^{from} L + K with their regular
load ~~800 + 900 Rev~~ + 900 Rev
each, & keep 100 volts in lamps
& grid. This greatest no volt
on leading wire can ~~have~~
have = 

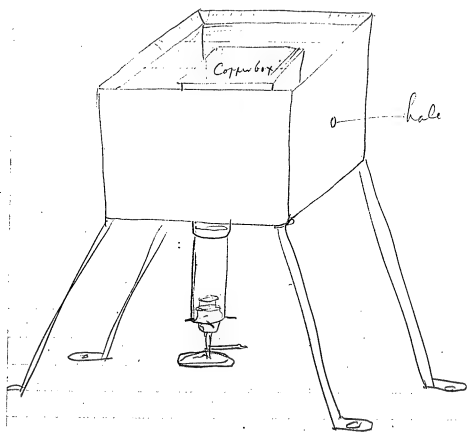
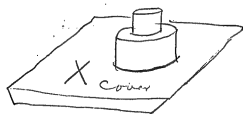
determine volts on K ~~with~~ with
Wire on all the left side of mag
left out, also, Connected ^{out}
neg way with wire of one field
open - ditto 2 open -





hole $\frac{1}{4}$
with handle





This is test of regulator
made with two dash pots
and sliding commutator it
~~seems~~ to work all right. This
test was taken as quick as
the deflection could be read
when given longer intervals
between each reading it would
indicate absolute correct

John L. Otte

Def	Volts	Lamps
148	96.76	1
144	96.83	5
143	96.13	10
144	- -	15
144	- -	20
180	97.75	25
144	96.13	30
180	97.75	35
148	96.76	40
146	95.59	45
180	97.75	50
143	93.94	60
180	97.75	65
145	95.05	70
143	93.94	75

Diff 3.78 Volts

Def	Volts	Lamps
150	97.75	75
180	97.75	70
144	96.13	65
180	97.75	60
180	97.75	55
144	96.13	50
180	97.75	45
144	96.13	40
180	97.75	35
144	96.13	30
148	96.67	25
144	96.59	20
180	97.75	15
149	97.21	10
180	97.75	1

Diff 1.62 Volts

Order 8.

Switches put in every 3 Seconds
& pulled at the expiration
of that time & 1 hole in the
Boxes cut out between each
Swelling when the both
Boxes are cut out take all
off blow Box; & change
to 169 & line & Peg out
one hole at a time up
to 130 & put Swells in
every 3 Seconds until tube
will not break any more
then brown at yellow for
10 minutes & Seal-off.

Order 9

Get Vacuum then put
on Current 55, 11 line
then cut out one hole
at all time on both
R & Wires Resist Boxes
keeping hand on Switch
& when tube breaks; pull
Switch immediately; when
tube does not break any more
change to 110 V line leave
R. Resist. Box cut out & move
one hole as tube becomes solid,
pulling Switch as soon as air
is going down when it does
not go down on 110 V line
put on 169 V & continue. *W*

breaking up the tube until
Clamps become clean & no
more air goes down tube
then put switch in & let
Ramps burn at 80 C
130 W. for 5 minutes &
take off current & Seal off.

THOMAS A. EDISON,

Central Station, Construction Dep't.,

NO. 65 FIFTH AVENUE,

Edison-Lamps & Filaments

(March 7, 1881)

New York, 188

Electroplating Carbons -

Feb 21/81 42 C lamps plate clumps can
be mixed -

Feb 22/81 5 carbons scanned in wire
substrate as for plating

Feb 25/81 27 paper cups treated by Dr. Haid
(Lew?) sent in plating solution -

Apparatus used by Lawson for plating
described -

Feb 2/81 Lawson carbons are generally
for another connection in plating
apparatus -

Feb 7/81 Lawson using three of the box
troughs for plating and today I am
through 150 cups -

Feb 24/81 150 carbons plated to the wire
Order no 202 (no date not known in whose
writing "deposit" clumps used - improved
method of plating used.

THOMAS A. EDISON,

Central Station, Construction Dep't.,

NO. 65 FIFTH AVENUE,

New York, 188

Wm J. Hammer writes Feb 7/81 will
send some of the "paper cups" up
shutley.

(1883)

NEW YORK _____ 188

Vital Statistics.

Carbonic Oxide is not merely passive in not supporting respiration, for an animal perishes if kept for sometime in an atmosphere containing a few per cent of this gas. To its presence must be attributed the uneasiness and headaches experienced in badly ventilated apartments. If a large proportion of Carbonic Oxide be present in a class-room shut room death ensues.

Reynolds, Chemistry
Vol. 1, Page 371.

(1883)

NEW YORK 188

Carbonic Oxide is a very poisonous gas inasmuch that it combines with the Hemoglobin of the blood. Small animals die almost almost instantly when placed in the gas and even very small quantities are inhaled and severe headaches giddiness and insensibility readily occur.

Race & S. Page 620
S. Hoffmann Publisher

Fatal effects of burning charcoal
The remarkable action of Carbonic Oxide appears to depend on the fact that the whole dissolved Oxygen is thereby expelled, the blood acquiring a purple red color.

Turn off signal St.
 National Bureau of Field of
 H. - 1 -

<u>Speed</u>	<u>Current in feet</u> <u>in tenths</u>	<u>Volts at</u> <u>1000</u>
1080 (2)	.4	9-
	.4	8.5
980 prob	.4	8.5-
	1.0	17-
	1.1	21
	1.2	22.0
	1.2	22-
	1.2 <u>1.2</u>	22 <u>22</u>
	1.2	22
990	1.1	22.5
	1.15	23-
	1.15	23
	3.5	64
	3.55	64.5
	3.6 <u>3.6</u>	65 <u>65 1/2</u>
	3.6	65.5
1000	3.6	65.5

Speed

Current
~~5.0~~
amp

Volts

945

3.5.0

64.5

3.5.0

64.0

5.15

82.5

5.00

82.

4.9.5

4.95

81.5

81.5

4.9.5

81.5

+ 1/20 =

4.9.5

81.5

85.6

~~4.9.5~~

~~81.5~~

~~4.9.5~~

~~82.5~~

~~4.9.5~~

~~82.5~~

~~5.00~~

~~85.~~

5.05

86.5

5.15

5.10

85.5

86.

5.15

87.0

5.15

87.0

7.25

100.5

7.30

99.5

7.30

99.5

7.35

100.0

7.35

100.0

1000

Speed

Current

Vald

965

$\frac{1}{2}$
- 35

7.40

7.40

7.35

7.40

7.45

7.50

7.50

7.60

7.70

7.75

7.80

7.90

7.95

8.00

8.00

8.10

8.20

8.30

8.40

8.50

8.60

8.70

8.80

8.90

9.00

9.10

9.20

9.30

9.40

100.

99.5

99.

100.5

102.5

101.5

105

106

106.5

106.5

107.5

108.5

108.5

109.0

112.5

110.0

109.0

112.0

112.5

112.5

112.0

112.5

112.5

112.5

112.0

112.0

112.0

112.0

100

+ $\frac{1}{2}$ =

104

107.3

+ $\frac{1}{2}$ =

107.8

108.5

109.0

110.2+

+ $\frac{1}{2}$ =

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

112.5

$$\frac{985}{385} \quad 2.5$$

<u>Current</u>	<u>Volt</u>
9.40	111 - 111.5
9.40	110 = 112.5
9.40 9.44	11.9

100.5

9.65	114.5
9.60	114.5
9.60 9.62	114.5 - 114.2 = 113.6
9.60	114.0
9.65	114.0
10.85	118.5
10.90 10.92	118.5 - 118.4 = 117.8
10.90	118.5
10.95	118.5
10.95	118.5
10.95	118.5
10.95	118.5

100.5

Barboursville. Reduced Spirit

950

12.80	115.5
12.80 <u>12.79</u>	115.5 <u>115.5</u>
12.75	115.5
12.80	115.5

12.05	205	175	265
12.00		114	
11.90 <u>11.80</u>		113	<u>112.6</u>

11.85	113
11.80	112
11.75	112

950

11.70	112
11.70	111.5
11.65	112
11.65	112

10.25	10.25 365
------------------	----------------------

10.10	107
10.10 <u>10.06</u>	106.5
10.10	106.5
10.05	106
10.00	105.5
10.00	105

915
8 4 1
7 5

106.1
+ 109.9

935

Current

Voltage

7.40

101.5

7.40

101.

7.2

104.

7.1

103.5

7.1

103.5

7.1 705

102.

$$\begin{array}{r} 102 - (-17) \\ 102 \\ 470 \\ 17 \\ \hline 101.3 \end{array}$$

7.05

103.

7.00

103

7.00

102.5

7.00102.5

4.7

78.5

4.7

78.

4.65

77.5

4.60 ^{78.5} _{1.68}

77.0

4.60

76.5

4.65

76.5

4.75

77.0

4.8077.0

$$\begin{array}{r} 965 - 167 \\ 62 \\ \hline 915 \end{array}$$

$$\begin{array}{r} 890 - 60 \\ 830 \\ \hline 190 \end{array}$$

$$\begin{array}{r} 516.0 \\ 13 \\ 26 \\ 1577.3 \\ 23 \\ \hline 52 \end{array}$$

$$\begin{array}{r} 57.4 \\ 77.3 \\ \hline 82.5 \end{array}$$

<u>Speed</u>	<u>Current</u>	<u>Volts</u>
--------------	----------------	--------------

9.60

4.70

86.

4.70

86.

4.70

86.

4.70

86.

2.80

60.5

2.80

60.5

2.80

60.5

9.55

2.80

59.5

2.75

59.5

2.75

59.0

2.70

58.0

2.65

58.0

2.60

57.0

2.60

56.0

2.60

59.0

1.65

58.5

1.65

58.0

1.70

59.0

1.70

59.0

1.70

59.5

1.30

12.0

1.25

11.0

1.25

10.5

1.25

10.0

1.25

10.0

1.25

9.5

1.25

9.5

1.25

9.0

9.50

C32 200134

$$\begin{array}{r} 92 \\ \hline 1206 \\ 268 \\ \hline \end{array}$$

C2 012328

$$\begin{array}{r} 123 \\ 121 \\ \hline 121 \\ 1246 \\ \hline 14681 \end{array}$$

$$\begin{array}{r} 123 \\ 124 \\ \hline 482 \\ 452 \\ \hline 17712 \end{array}$$

$$\begin{array}{r} 48 \\ \hline 0408 \end{array}$$

$$\begin{array}{r} 123 \\ 44 \\ \hline 482 \\ 382 \\ \hline 7872 \end{array}$$

$$\begin{array}{r} 123 \\ 56 \\ \hline 538 \\ 152 \\ \hline 1788 \end{array}$$

$$\begin{array}{r} 123 \\ 48 \\ \hline 1107 \\ 492 \\ \hline 60 \end{array}$$

$$\begin{array}{r} 123 \\ 25 \\ \hline 015 \\ 246 \\ \hline 0075 \end{array}$$

$$\begin{array}{r} 123 \\ 36 \\ \hline 738 \\ 588 \\ \hline 4428 \end{array}$$

$$\begin{array}{r} 120 \\ 84 \\ \hline 127 \\ 984 \\ \hline 9963 \end{array}$$

$$\begin{array}{r} 13 \\ 59 \\ \hline 12 \\ 168 \\ \hline 123 \\ 517 \\ \hline 258 \\ 168 \\ \hline 6767 \end{array}$$

THOMAS A. EDISON,

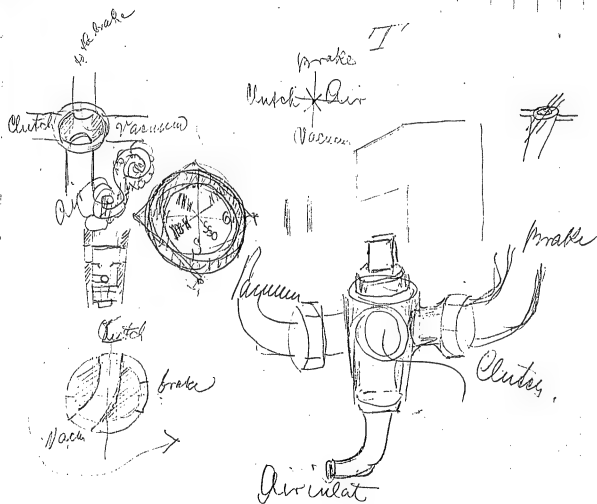
Central Station, Construction Dept.,
No. 65 FIFTH AVENUE,
NEW YORK.

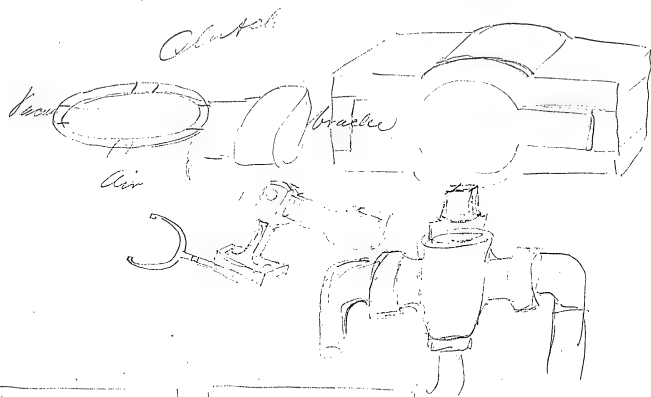
Address reply to _____

Figure 22.

W. D. RICH,
SIFT OF CONSTRUCTION.

188



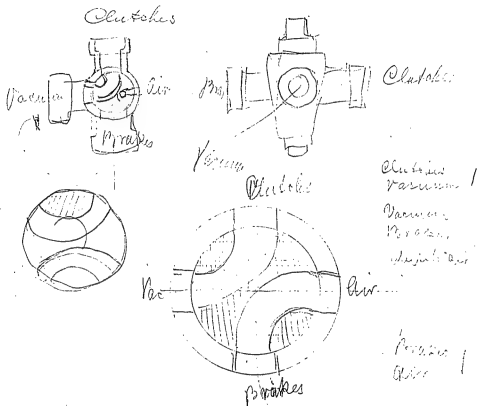


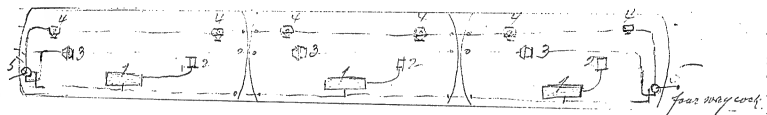
THOMAS A. EDISON,
Central Station, Construction Dep't.,
No. 65 FIFTH AVENUE,
NEW YORK.

Form 31.
W. D. RICH,
SUPT OF CONSTRUCTION.

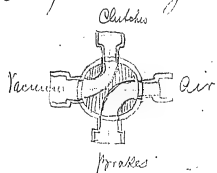
188

Address reply to.....





- 1 vacuum chamber } connected going to the four way cock
- 2 pump
- 3 brake diaphragm all connected going to four way cock
- 4 Clutch diaphragm all connected is
- 5 four way cock on the end of each train



THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

New York, 188

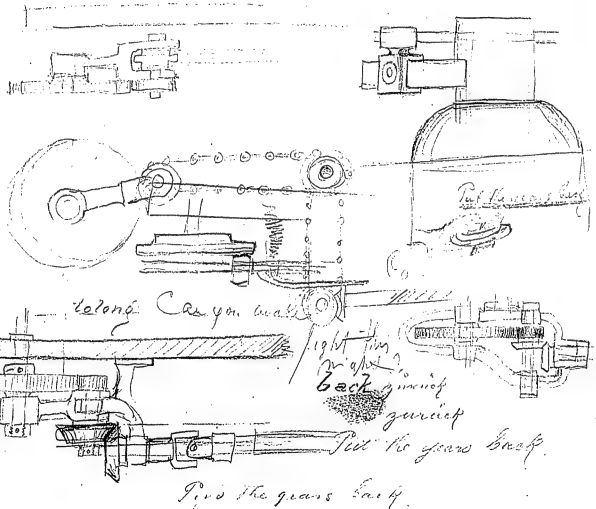


FIG. 1.

FIG. 2.

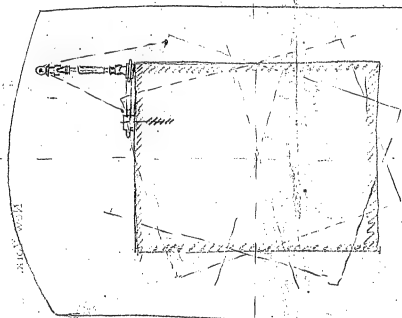
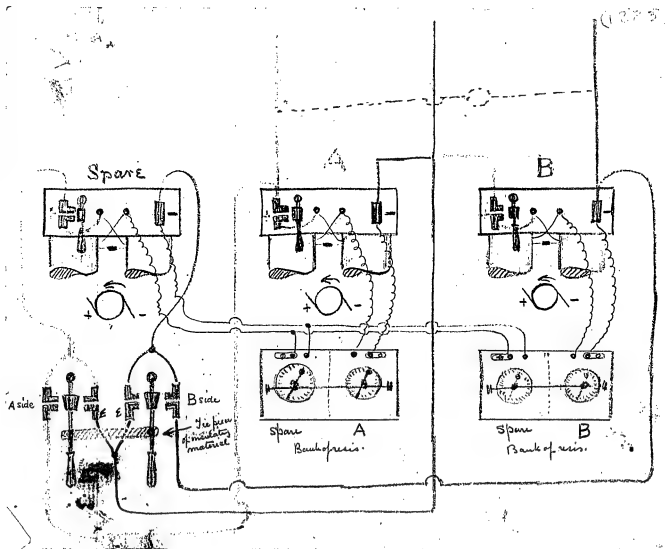
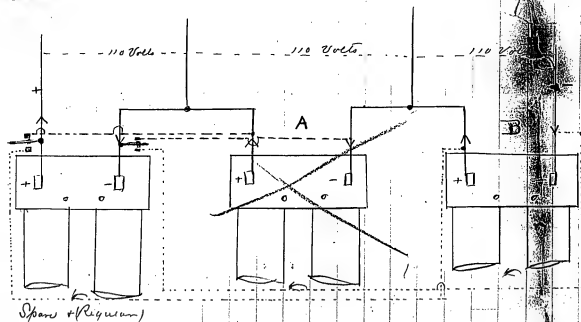


FIG. 3.

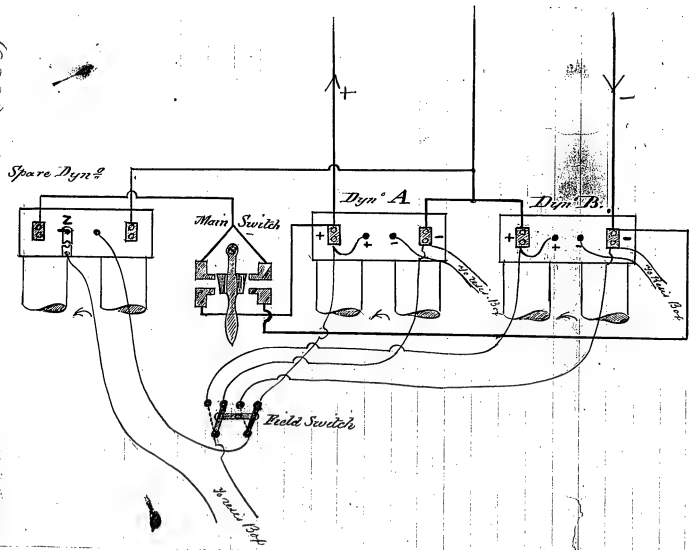


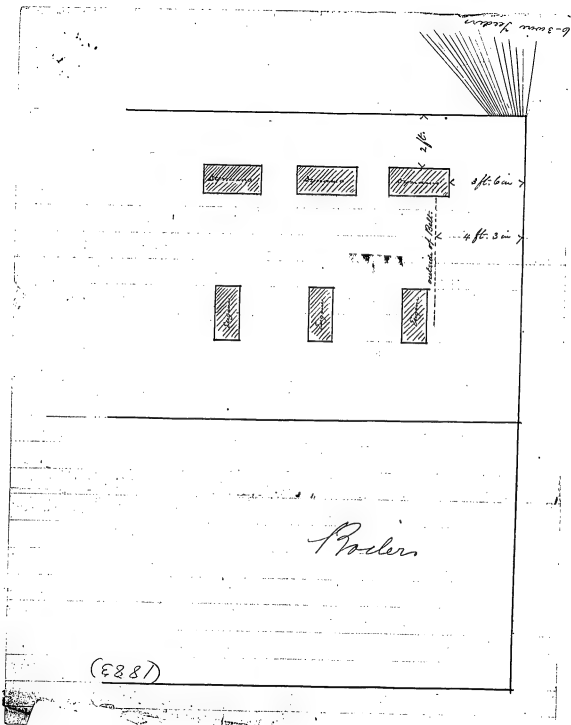


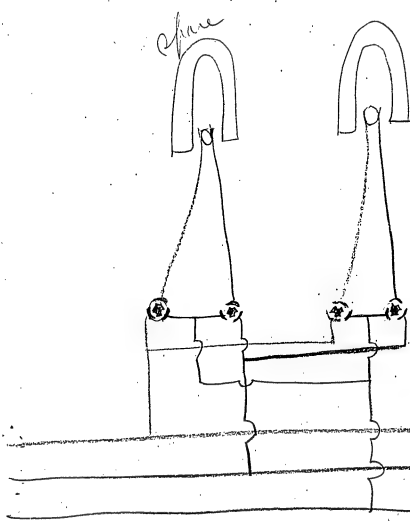
--- Connections used when helping $\frac{A}{B}$ Dynamometer

(1883)

(1883)







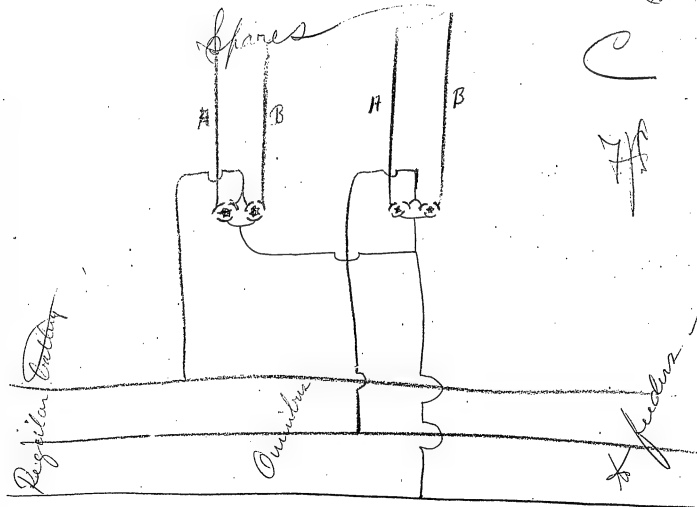
spare

B

(1883)

7/11

(893)

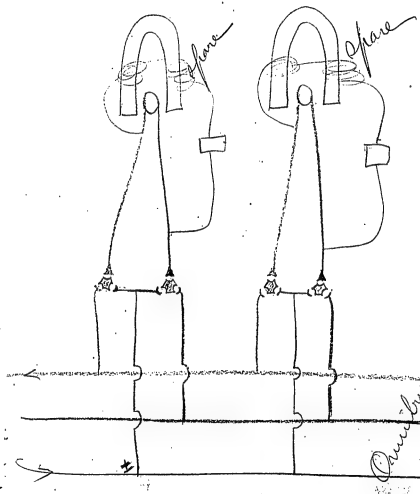


(1883)

A

~~7/13~~

To dynamo battery



On business wires

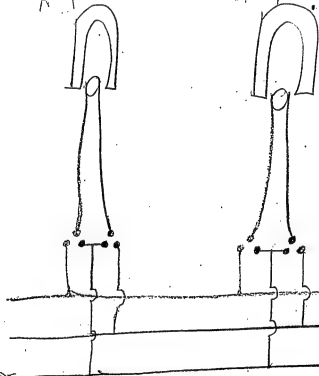
To feeder

(883)

A phase

B phase

Major regular battery
of malurus

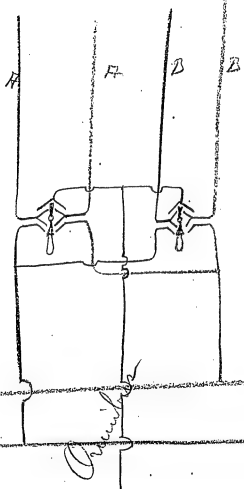


Quartz wire

10 feet

(1883)

~~F~~
~~F~~



X regular ~~city~~

Pump

X feeder

1883)

frames

A

A

B

B

E

~~A~~

to regular
~~to~~

Quintus

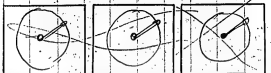
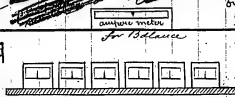
to feed
~~to~~

1883
Electric Light -
Drawings

(1883)

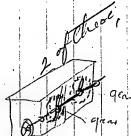
3/4" diameter
cable column

1 2 3 4 5 6



- floor -

We want an ampere meter
on P.N. of ammeter also
to show load - place
there.



(1883)

28

H. S. Andrews

Plans for Antislavery

#	Test	Description	Dia.	Fall per min. in °C	Temperature in °C	Increase in °C	% of fall in °C	Fall per min. in °C	% of fall in °C	Approximate absolute increase
1		Regular #12 low fall.	0.126	2 ± 30%	62	42	52			
2		#12 with low glow	0.126	14 ± 10%	69	52.5	28			
3		#12 with low glow	0.125	15 ± 30%	73	53	1			
4		Reg. #12 low fall.	0.135	18 ± 15%	68	50	16	27	53	99.5
5		#12 with low glow	0.125	11 ± 10%	73	55	18			
6		Reg. #16	0.125	15 ± 5%	64	40.5	12			
7		#16 with low glow	0.065	119 ± 10%	47	24	08	06	22	34
8		#12 with low glow	0.126	125 ± 5%	71	46	16	03	66	100 ± 5% ^{max}

Inside temperature means in bolt hole
Outside " " on surface

Summary: It is a question whether the #12 with
an iron glow did increase much beyond a

By M. Chas. W. 2

$\frac{2}{34689}$
17344

Harrison Ave. 1678584

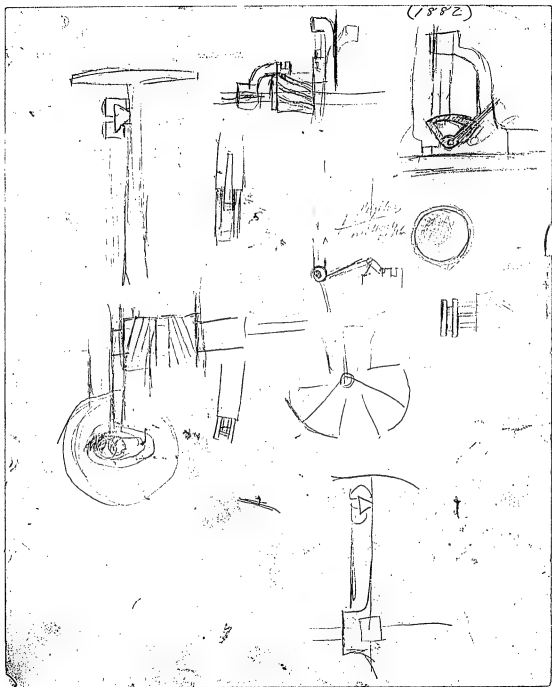
3 $\frac{2}{16-\frac{1}{3}}$
 $\frac{18}{1}$

16785
Harrison
Harrison.

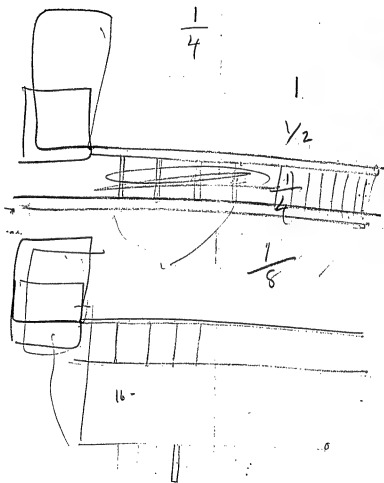
6 6 64

Landmaaling of middle

Answer



60
60



[ON BACK OF PRECEDING PAGE]

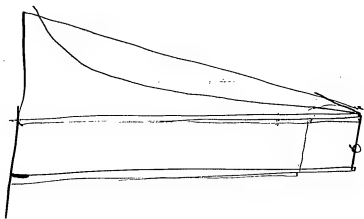
The Edison Electric Light Company,

65 Fifth Avenue,

New York, 188

Harold Green, Pres.
S. S. Green, Vice-Pres.
E. P. Fabbri, Treas.
C. Goodland, Sec'y.

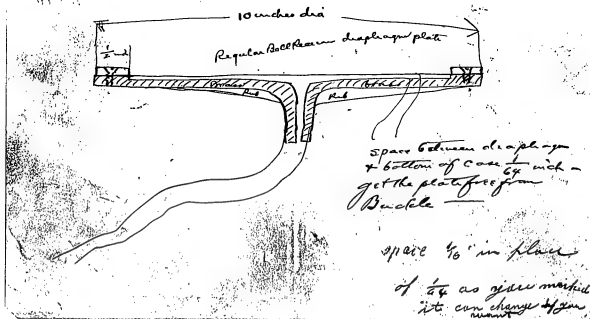
*This bundle is composed
of some old sketches that
do not seem to have any date
to them*



cost

(1885-02-09)

John Att =



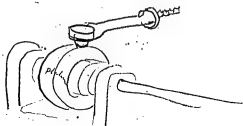
THOS. A. EDISON CONSTRUCTION DEPT. No. 65 FIFTH AVENUE, NEW YORK,		Dear Sirs: Please find under same cover Invoices duly certified as correct by me from parties named below:	
DATE	NAME	AMOUNT	APPROPRIATION
<i>Finished</i>			
Yours Truly, Supt.			

①

(1884)

Chalk Telegraph

John please make a cylinder of brass covered with platinum to go in place of the Chalk. The platinum wheel should be the



same diameter as the Chalk is when turned up - use thick platinum so as to get a perfectly true & polished surface - The pen connected to the diaphragm is to hold the Chalk which may be the same size as you have already a model for this ☐ you can

name the cylinder the size and put a cup on the pen (platinized) inside & split clamp = taper the end of the Chalk thus



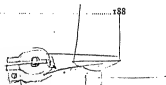
THOS. A. EDISON,
Central Station Construction Department,
98 FIFTH AVENUE.

[Form T. 1000-10-7-12]



New York, 188

To,



DEAR SIR:

I send you by Blue Print of
on which I have marked in red pencil the portion of the town within which it is desirable that
our Electric Light Central Station should be located. I shall be glad if you will obtain for me
information on the following points concerning any lots for sale within the area marked:

Exact size of each lot.

Price of each lot.

Nature of soil.

Whether each lot is level.

Elevation of each above water-line.

If there is a building on any of the lots, and whether wood or brick; and for what purpose
it has been used.

Full dimensions of building, including height of same, thickness of walls, size of rooms,
whether more than one floor.

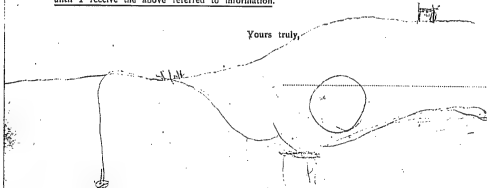
Whether building in good repair.

When sending me this information, please return Blue Print with the position of each lot
clearly marked on it.

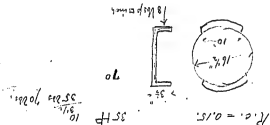
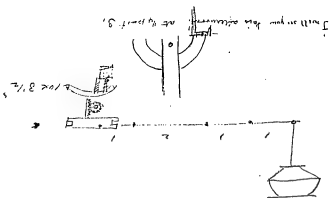
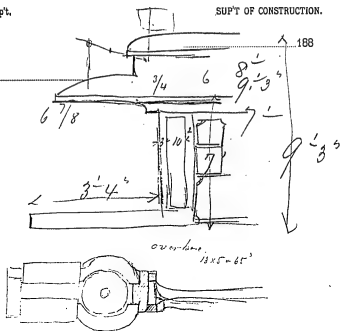
It is not at all necessary that the lot for our Central Station should be located on a prominent
street, where property is in great demand, and consequently very expensive. We desire a lot as
near the centre of lighting as possible, and such a lot can usually be obtained in a back street
or alley, where property, as a rule, is comparatively cheap.

Please reply as promptly as possible, as it is impossible for me to proceed with the estimate
until I receive the above referred to information.

Yours truly,



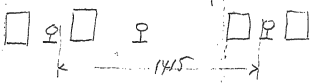
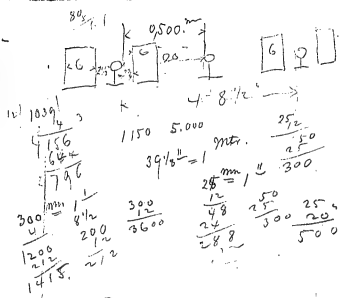
Form M.
W. D. RICH,
SUPT OF CONSTRUCTION.



To take



$$1.415^{mFr} = 4 \div 8 \frac{1}{2} \%$$



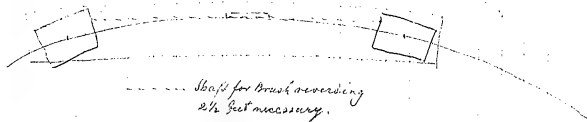
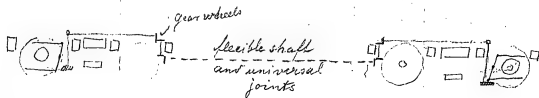
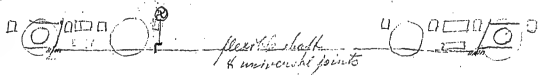
THOMAS A. EDISON,

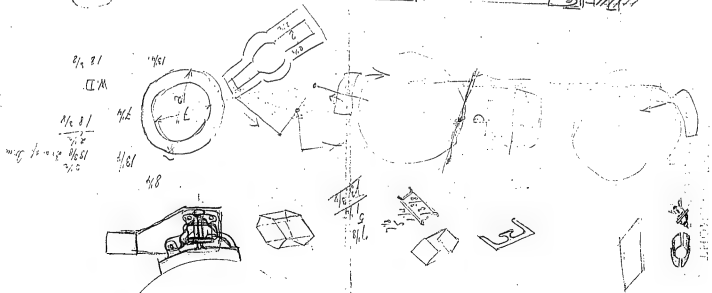
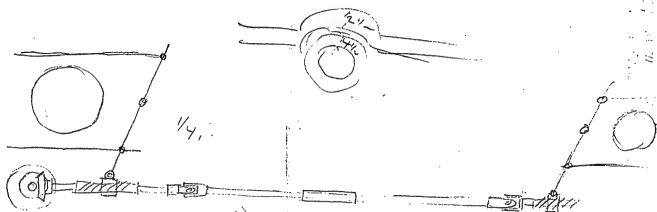
Central Station, Construction Dept.,
No. 65 FIFTH AVENUE,
NEW YORK.

Address reply to _____

Page 21.
W. D. RICH,
Supt. of Construction.

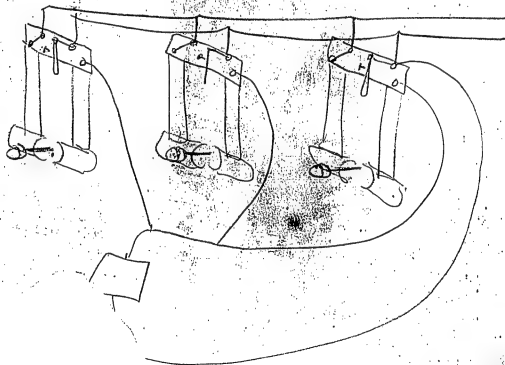
188





(1885)

When 3 machines are placed
together, they should be connected
thus providing none of the pulleys face
each other.



THOMAS A. EDISON,
Central Station, Construction Dep't,
No. 65 FIFTH AVENUE,
NEW YORK.

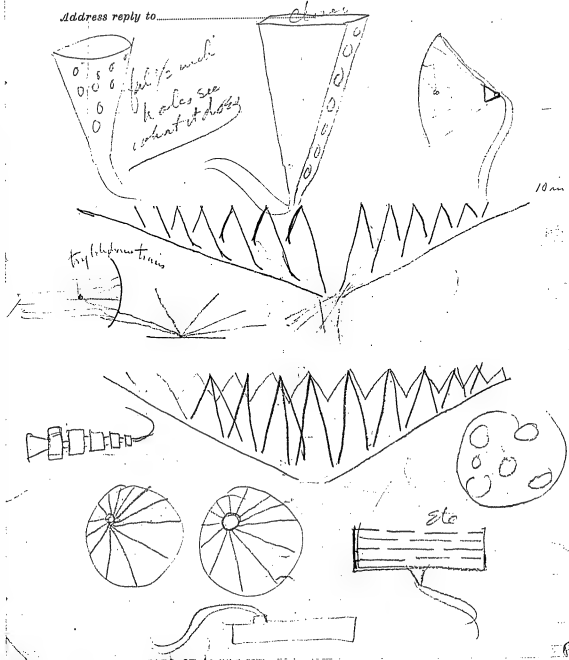
(1883)

Form No.

W. D. RICH,
SUPT OF CONSTRUCTION

188

Address reply to.....

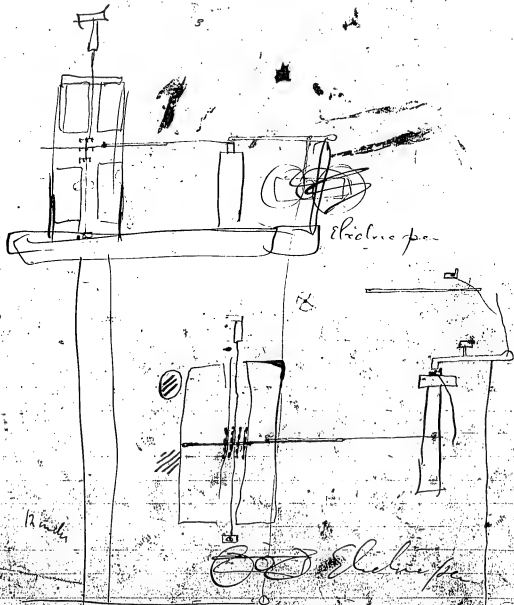


THOMAS A. EDISON,
Central Station, Construction Dep't,
NO. 65 FIFTH AVENUE,
NEW YORK.

1884-12-01
W. D. RICH,
SUPT OF CONSTRUCTION

188

Address reply to _____



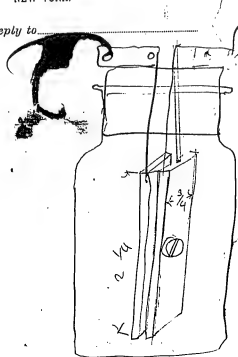
THOMAS A. EDISON,
Central Station, Construction Dep't,
No. 65 FIFTH AVENUE.
NEW YORK.

Printing 3.4.7. 1884-12-21 Form 21.

W. D. RICH,
SUPT OF CONSTRUCTION.

188

Address reply to



200 543

- | | |
|--------------------------|--------------------|
| 50 Lead X | 20 Phosphide Iron |
| 50 Zinc X | 20 Phosphide Lead |
| 50 Carbon | 20 Sulphide Lead |
| 50 Tin | 20 Sulphide Iron |
| 50 Brass X | 20 Sulphide Copper |
| 50 Copper X | 20 " Tin |
| 50 Iron X | 10 Nickles |
| 10 Cadmium X | |
| 10 Bismuth | |
| 10 Antimony X | |
| 10 Silver | |
| 10 Aluminium | |

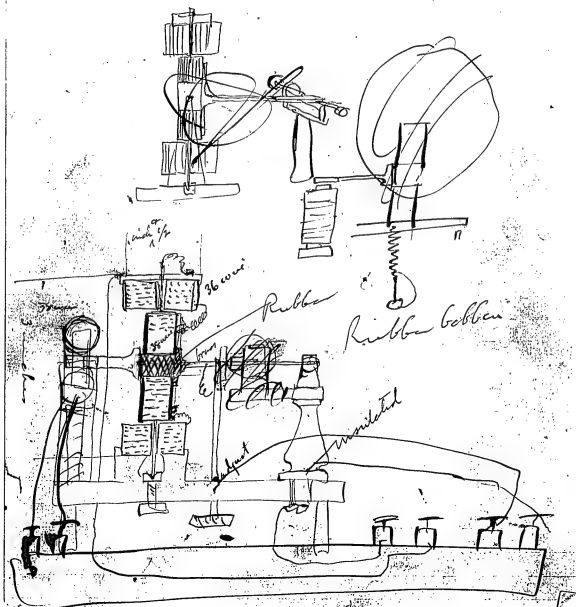
Make 20 more of Iron

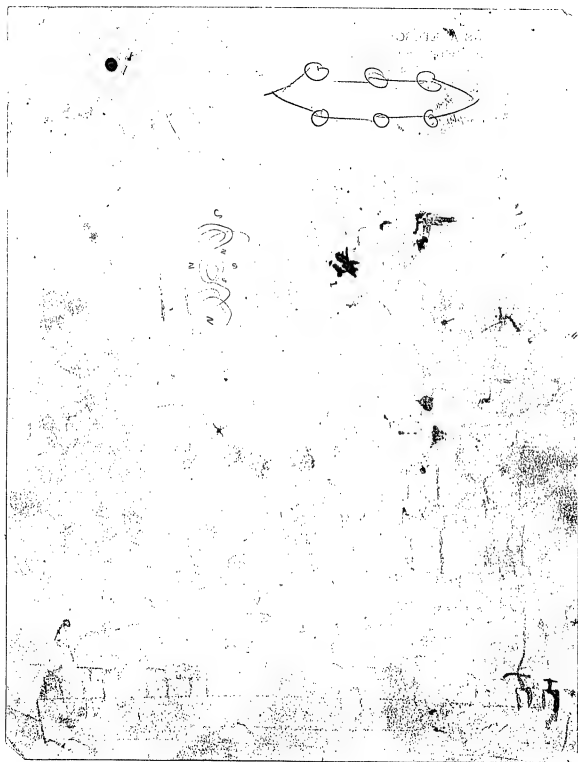
THOMAS A. EDISON,
Central Station, Construction Dep't,
No. 65 FIFTH AVENUE,
NEW YORK.

1884-12-28
W. D. RICH.
SUPT OF CONSTRUCTION

188

Address reply to.....



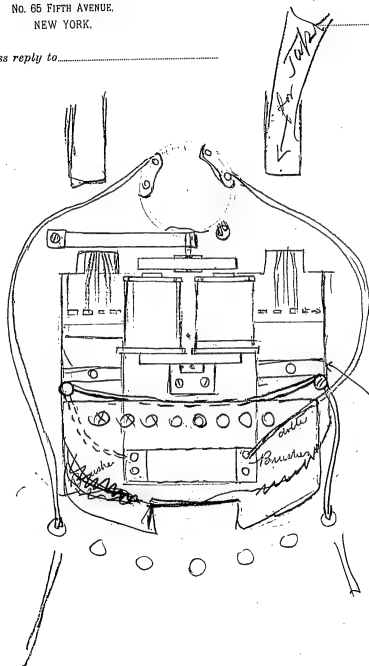


THOMAS A. EDISON,
Central Station, Construction Dep't.,
No. 65 FIFTH AVENUE,
NEW YORK.

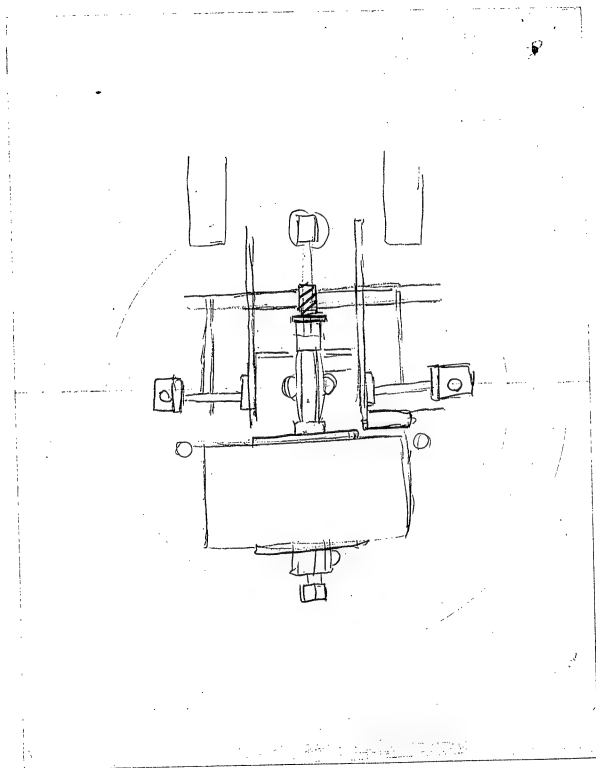
Figure No.
W. D. RICH,
SUPT OF CONSTRUCTION

188

Address reply to _____



Piece of iron
for wires to
pass thru

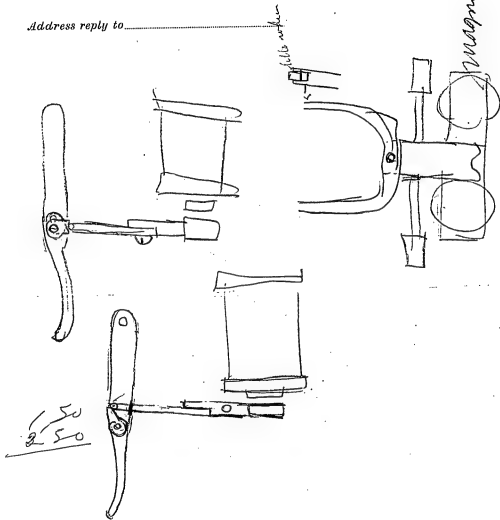


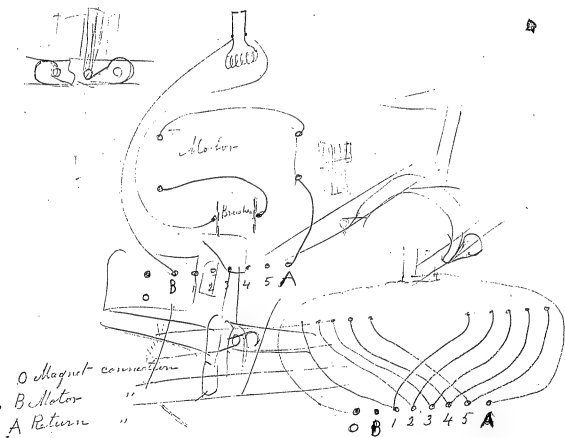
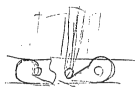
THOMAS A. EDISON,
Central Station, Construction Dept.,
No. 65 FIFTH AVENUE,
NEW YORK.

Form M.
W. D. RICH.
SUPT OF CONSTRUCTION

188

Address reply to _____





O Magnet connection
B Motor
A Return

(1884)
Edison Effect?

BERGMANN & CO. ELECTRICAL WORKS,

Patentless and authorized Manufacturers of
EDISON ELECTRIC LIGHT FIXTURES AND APPLIANCES,

COMBINATION (Electric Light and Gas) FIXTURES A SPECIALTY.
DESIGNS AND ESTIMATES FURNISHED ON APPLICATION.

The Most Complete Facilities for all kinds of Electrical Work.

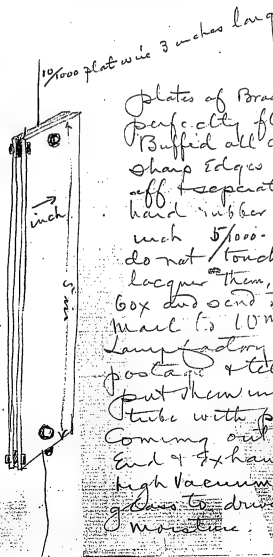
292, 294, 296 AND 298 AVENUE B,

New York,

188

John A. H.

6 of this

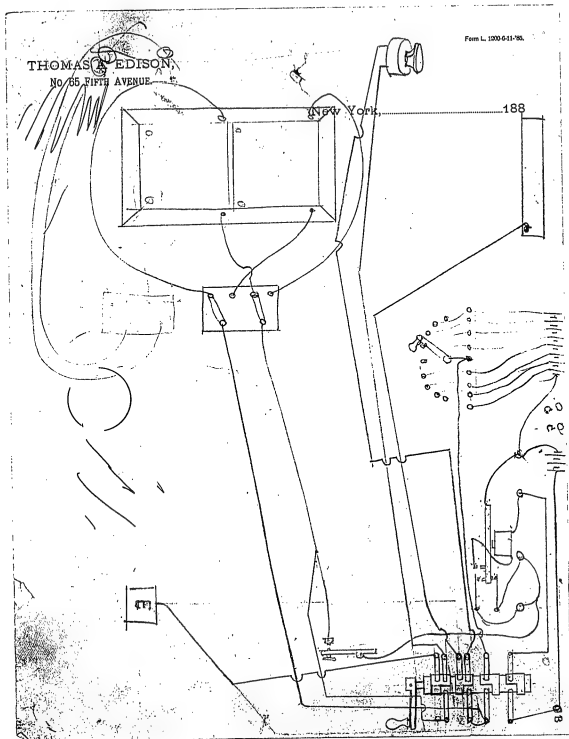


plates of Brass $\frac{1}{16}$ thick
perfectly flat &
Buffed all over with
sharp edges buffed
off & separated with
hard rubber $\frac{1}{200}$ of
inch $\frac{5}{1000}$ - because they
do not touch, don't
lacquer them, then get a
box and send them by
mail to 10 m. H. O. H. O.
Lamp factory pay full
postage & tell him to
put them in glass
tube with platinum
coming out at each
end & exhaust to
high vacuum heating
glass to drive out
moisture.

THOMAS A. EDISON

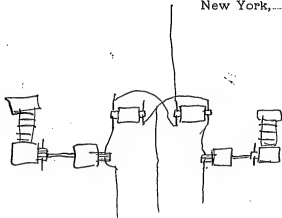
No. 65 FIFTH AVENUE

Form L, 1200-6-11-'86.



THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

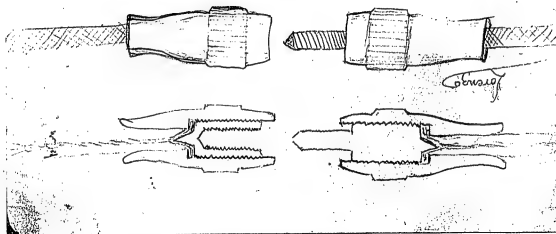
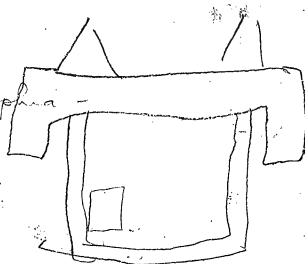
New York,188



THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

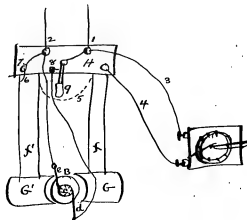
New York, 188

Alkali
Castor Oil
Benzene
Sulphur - Morphine



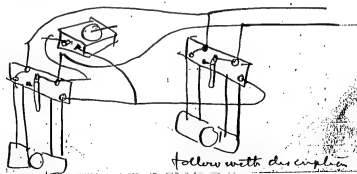
(1885)

When a single machine is used the method of connecting is shown in the annexed diagram



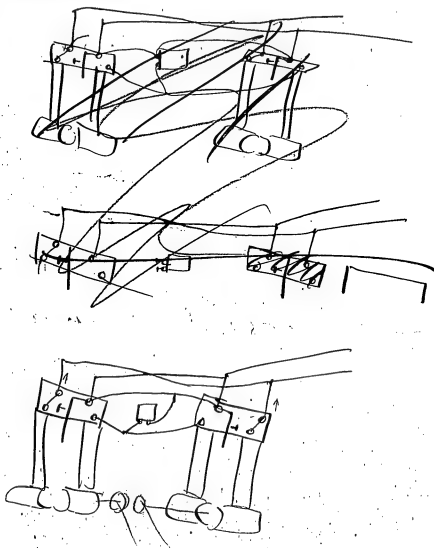
description here follows

When two machines are to be connected and the belts are to machines are to stand in the same way, that is to say when the two pulleys do not face each other



follow with description

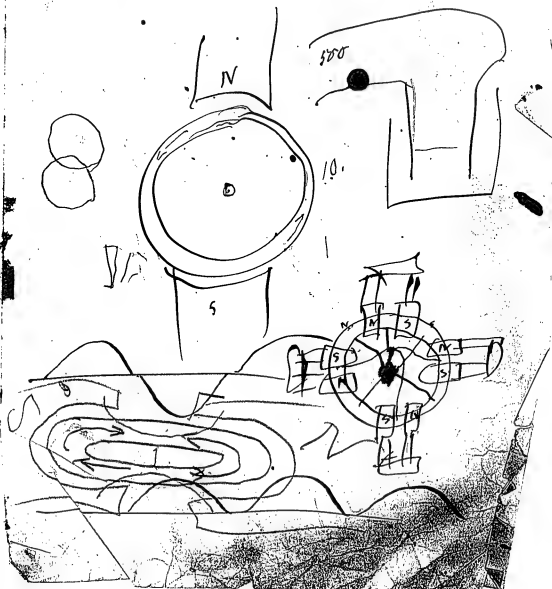
If the machines are to have their pulleys facing
each other, ~~either~~ the main wires ~~are~~
~~held down~~ should be crossed thus



THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

(1886) Form L. 1890-2-15-90.

New York, 188

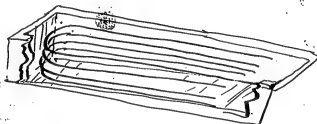


THOMAS A. EDISON,
NO. 65 FIFTH AVENUE.

Form L. 1882-13-50

(1886)

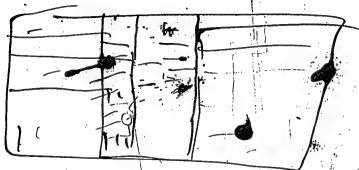
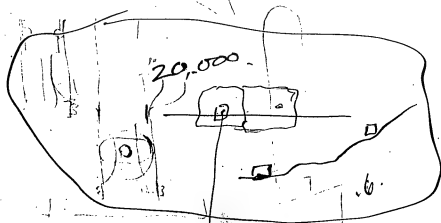
New York, _____ 188

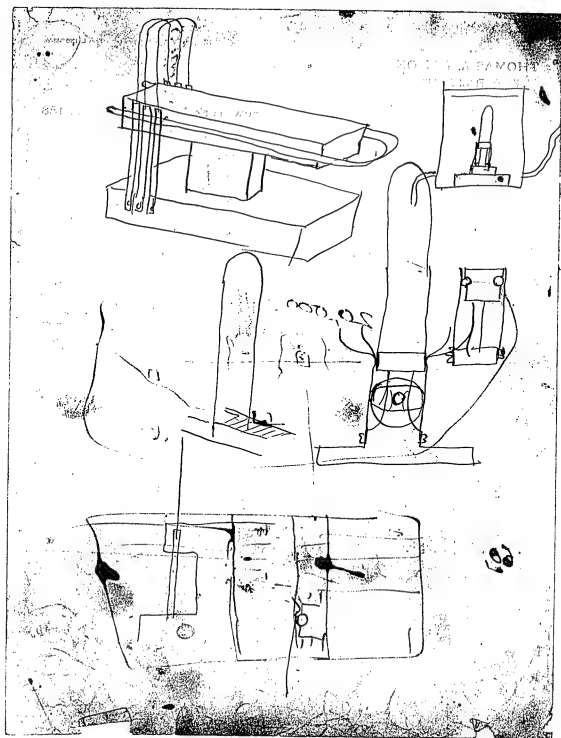


THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

Form L, 1200-10-50

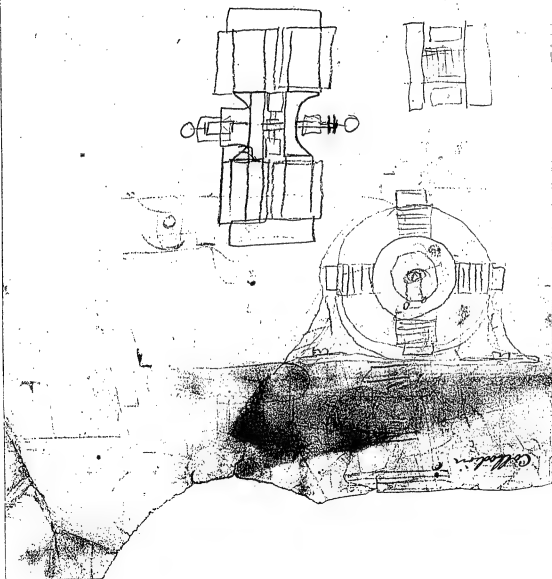
New York, _____ 188





THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

New York,.....188



Regular Edison Transmitter

Electric fan motor - but Robert Cowdron is making
Should there be a
battery here?

Local magnet

Is this lens
pivoted about center?

free wire relay

Copper covered core permanent
magnet

main battery

Earth

Telephone

Earth

Dick - This is the apparatus
that works beautifully
Prepare papers -

perhaps this is the patent
to make the bond

Change instead of the
the only sent for the
this relay

X may be a polarized relay

THOMAS A. EDISON,
NO. 65 FIFTH AVENUE

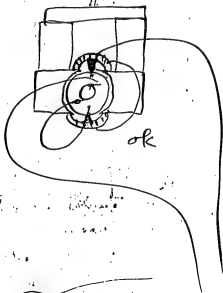
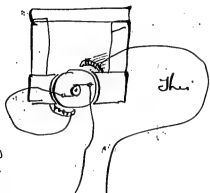
THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

Form L. 2000-8-18-'96.

New York, 188

plus argument

4

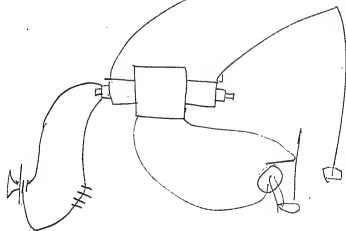


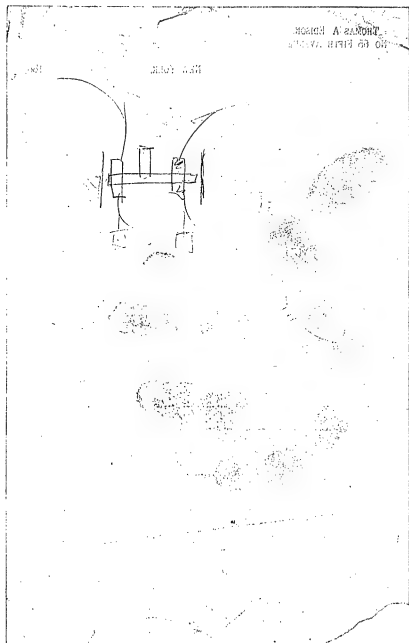
Look up Mark's Patent



THOMAS A. EDISON,
NO. 65 FIFTH AVENUE.

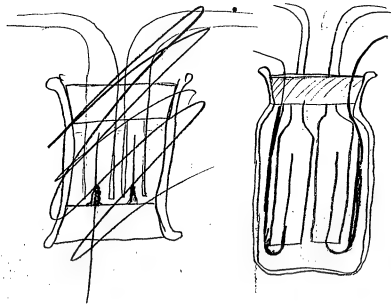
NEW YORK, 188-



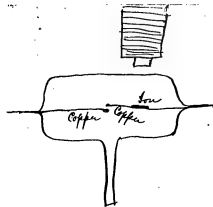
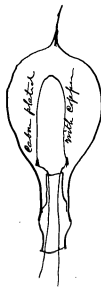
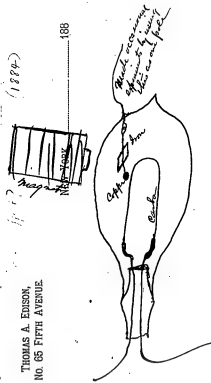


THOMAS A. EDISON,
NO. 65 FIFTH AVENUE.

NEW YORK.....188



THOMAS A. EDISON,
NO. 65 FIFTH AVENUE.

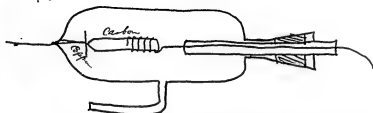


THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

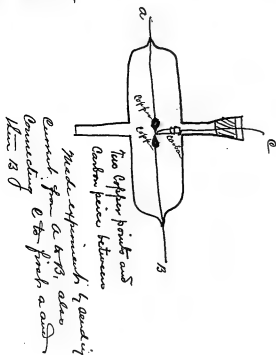
Jan 11 1884

(1884)

NEW YORK, _____ 188



*With Carbon point and Copper disc
Same experiment but used Copper point as well
as copper disc*

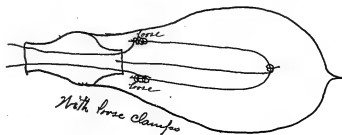


*Two copper points and
Carbon point between
them
Make experiment 1/2 second in
current from a battery, also
connecting c to finish a and
then b*

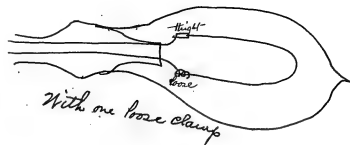
THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

Jan 11 1884 (1884)

NEW YORK, _____ 188



With hose clamps



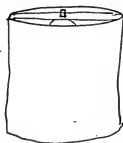
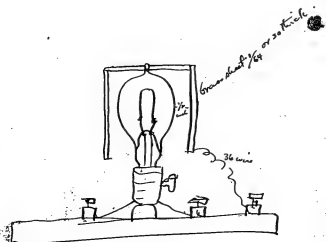
With one hose clamp

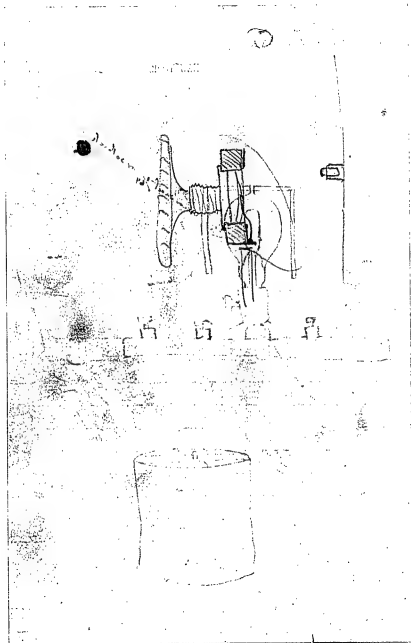
THOMAS A. EDISON,
NO. 65 FIFTH AVENUE.

NEW YORK,

Dec 1 1884

J. F. 1884
M. H. F.

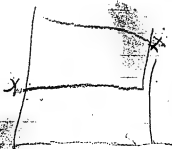
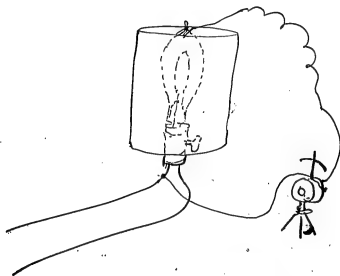


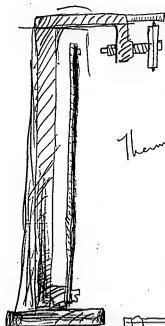


THOMAS A. EDISON,
No. 65 FIFTH AVENUE.

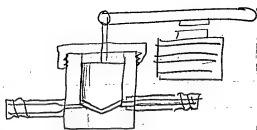
NEW YORK, Dec 1, 1884

J. F. M.



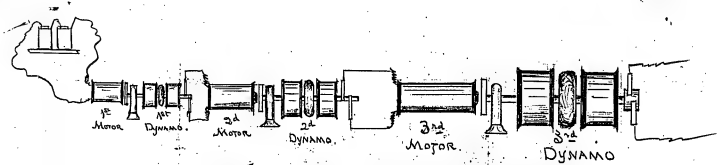


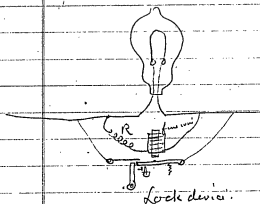
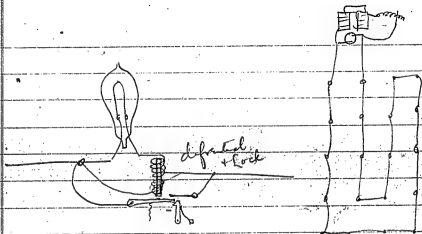
Thermometer Regulator



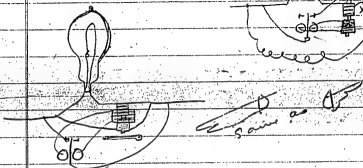
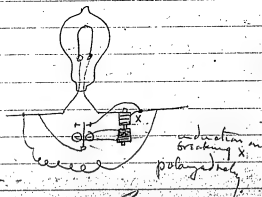
gas Regulator

(1883)

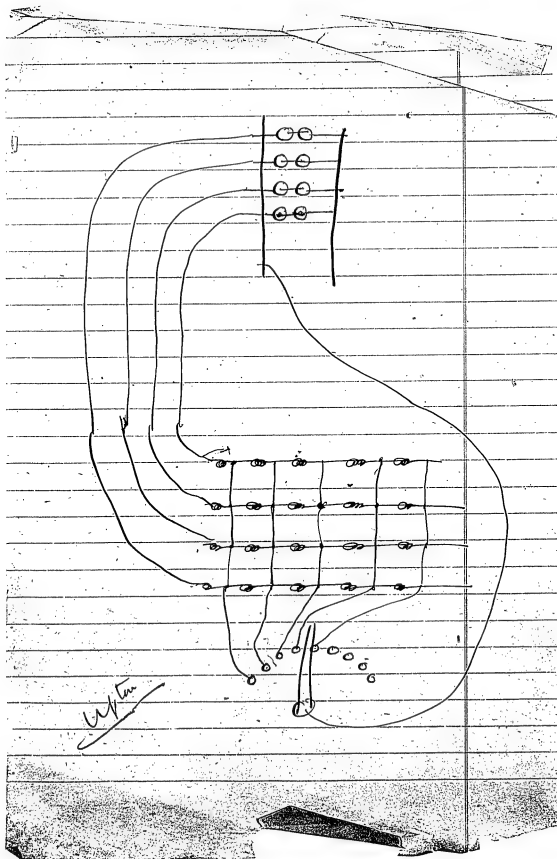




System of Albert Langley
by induction



Automatic Cut-outs in case lamp is broken - Dyer interposes a spare lamp in place of short circuit & have a case already in place. When you get broad claim for cut-off for secondary lamp in bar use, not only with spare lamp but without using in dead short circuit.





Several filaments twisted together



R₁



German Silver Brush

Long with Vacuum less than 1 millimeter
so. carbonizing takes place at clamp or less.
Carbon filament twisted in gas Cyanogen than
Vacuum make how

Plumbagoed surface to filament.

Insulation where wind is possible -
insulation between layers



Use parchment
with
paper Japan

see Westinghouse patent if no insulate
insulating layer clear insulate using paper or
on covering wire from the other

patent our brush -
End in -

primo in phos bronze for binding wire

claim a flexible filament of
Carbon formed by carbonizing a flexible
filament of organic material & during or
after the carbonization depositing Carbon upon the
surface of the same in combination with or

German Silver
Brush
1883

If 65 ^{5th} ave had a 250 light machine and ran that number of lights for 4 hours 30 days =

Cookplait

Engine

Boiler . 45 @ 50 hp power

Setting Engine Boiler

Dynamo

Regulator

Belt

Extras

750

1000

250

1350

25

25

50

\$ 3450

Depreciation, 8 pct

276

Engineer

800

Oil waste

40

Water

75

Brush

20

500 Lamps ^{Gro to 16 candles only}

250

95 tons coal 5 lbs per hp

427

\$ 1888

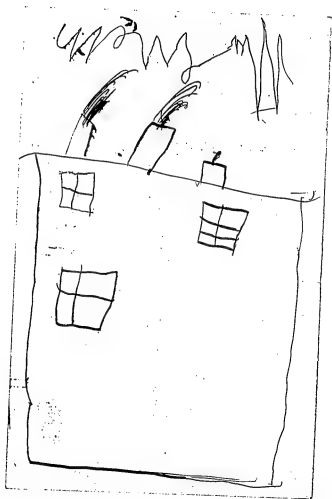
250 lights burning 1200 hours equal to $7\frac{1}{2}$ C feet gas equals 2'250 M⁶ costing 1888 if we sold for 25% we should get \$5062. leaving \$3174 to pay interest. The cost per M. without expenses. Meters & exc. rent etc. would be about 83 Cents,

Elec Lt. (1881)

Wand foot lbs. ^{at} ~~resistance~~ barely visible
red in dark room - then at red then bright
red then yellowish red, then reddish
yellow, then yellow, bright yellow
then whitish yellow also when
it gets to 1 candle then candle
by candle up to as high as
you can go say 50 candle
then give it at 60 80 &
100 candles

also resistance of lamp
at all the
above intervals,

want table of resistances
necessary to insert in circuit
of a lamp. 10 p.p. in current
to bring it from ~~40~~ ^{16 candles up to} down to
1 candle & lower through all the
shades as above - also another
table from 16 candles ^{up to} down
candle by candle, through all
the gradations.

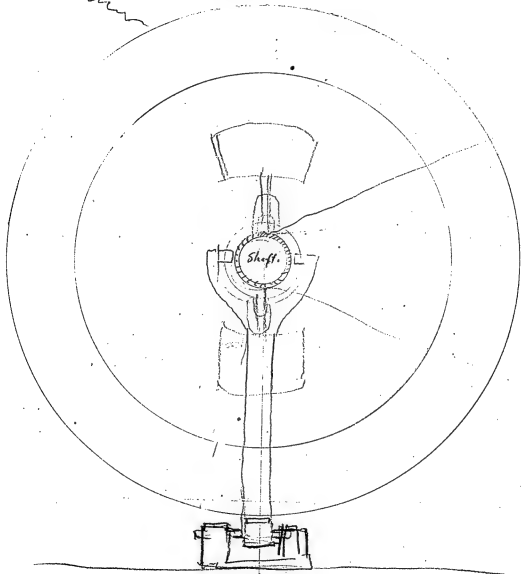


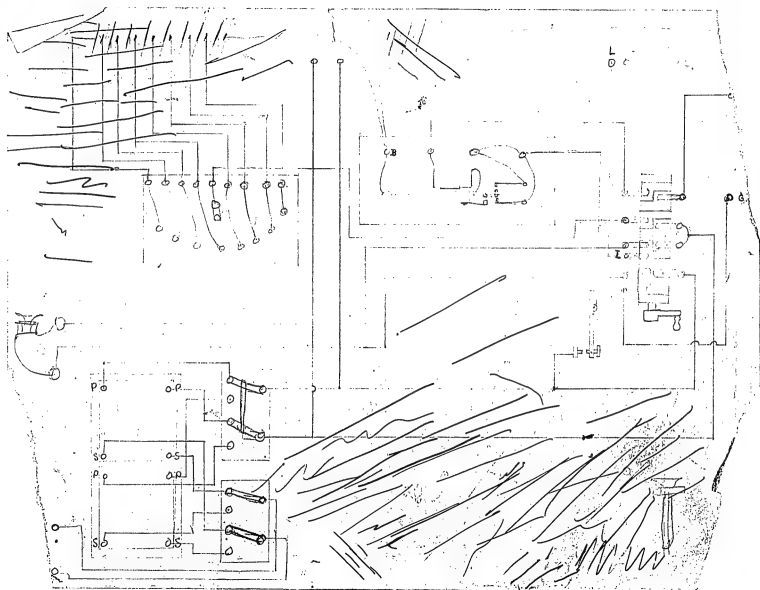
O dose of camphor is destroyed by ~~decoloration~~
of albumen, soap, urine, balsam tolu,
disguised by musk.

(amplic acid & the camphates

Governor

Model Governor



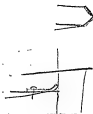
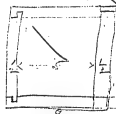
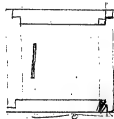


Mill Photometer

Inside Length 53 ins
 Outside " 54 "
 Inside width 5 "
 " Height 5 "
 Outside " width 6 "

Sides &

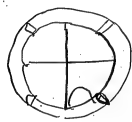
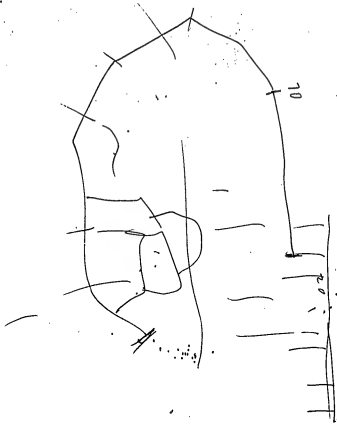
Carriage to Lamp 48 in
 (Center to center)



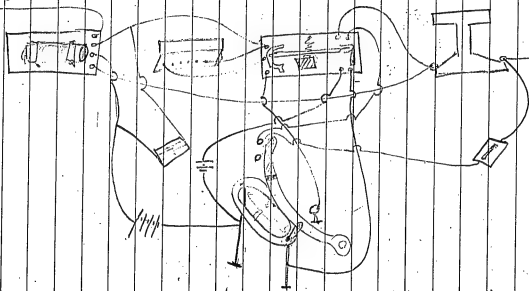
11	25.7+	25.8 - 25.6+
12	25.900	25.900 25.5-
13	26.2	26.1+
14	26.4-	26.4
15	26.300	26.3+
17	24.4	24.2
18	26.2 -	24.9. all the
19	26.000	26.0 - the end all the
20	26.3+	26.1
21	26.5-	24.8 strong all the
22	25.3	25.0
23	26.4+	26.3
24	26.400	26.2
25	26.6	25.5
26	25.9+	25.700
27	25.7+	25.6

26 = 26.2 + - 26.

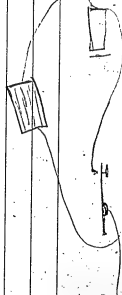
Starts 100 amper. Battery would
begin to work in 100 volt. the 9.12
taken out again.
Starts about 7 P.M.

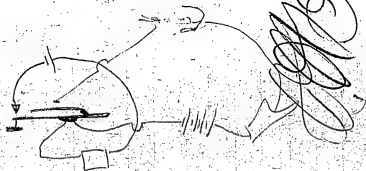


main line

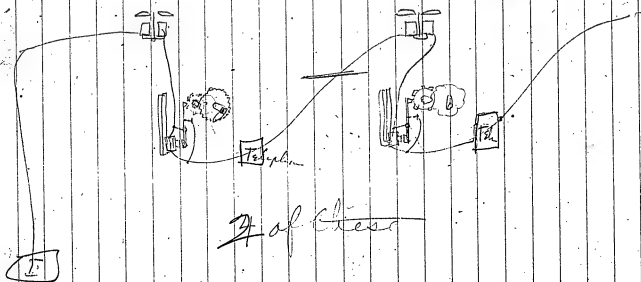


main line



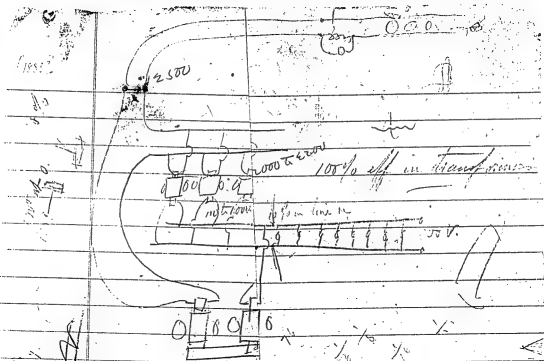


[Handwritten signature]
A.C.



4 of after farm break - g

Mr Kenzie



Total C = 100 Amp = 25,000 Watts

At no load = 2000V = 800 in meter

At 1/2 load = 2100V = 400 in meter

+ 30% of load of this transformer = (2000 Amp)

= 1,000 Amp. This gives 200 amp for secondary transformer at 100V.

This has been accomplished by strengthening

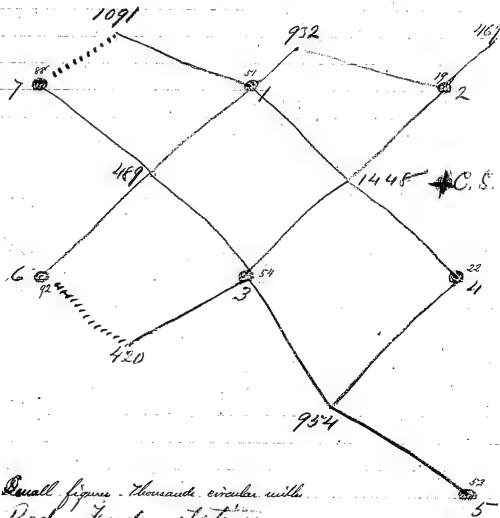
field. At full load it takes 338 amp + there are 300V - 16.6% total =

AWW

Control Stns

Diagram of Supply

(1885)



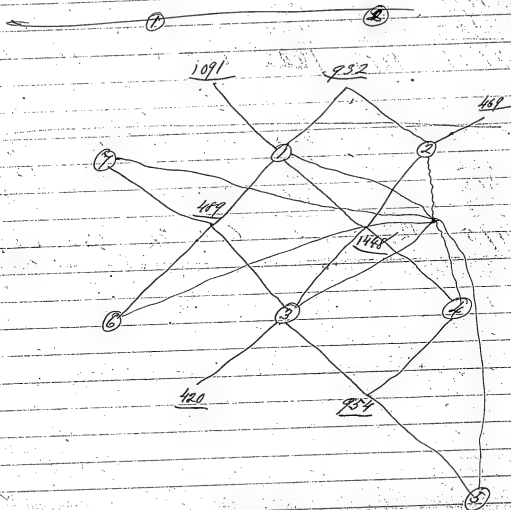
Small figures - thousands circular with

Red Feeder stations

Blue Diagram of mains

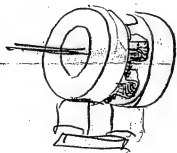
Central Isl.

(1885)



1	2	3	4	5	6	7
362	362	318	318	318	122	122
466	469	362	362			
1091	466	122				
122		420				
2041	1297	1222	680	318	122	122

545	466	362	362	318	122	545
122	469	122	318		210	122
466	362	210				
362		318				
1495	1297	1012	680	318	332	667



$$\frac{2110}{2} = 1055$$

$$\frac{1324}{2} = 662$$

$$\frac{1324}{2} = 662$$

$$\frac{9696}{2} = 4848$$

$$\frac{1324}{2} = 662$$

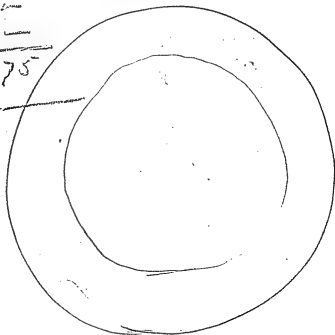
$$\frac{96}{2} = 48$$

1001

IN THE EIGHT VARIOUS
EDITIONS OF EDISON

18 —
 7.25 —
 12 —
 5 —
 7-50
 6 —
 12 —

 67.75



=

New York, 188

THOMAS A. EDISON,
 No. 66 FIFTH AVENUE.

Form L. 1000-10-00.

THOMAS
NO. 65 FIFTH

NEW YORK

188

~~Zinc~~
Nickel
Iron
Brass
Copper
Silver
Platina
Magnesium
Aluminum
Cadmium
Mercury in glass tubes
Gold

rubber

Printing Solution Standard

Pot. Ferricyanide 3 lbs
 Ammon. iron citrate 5 "
 Water 40 "

3 minutes exposure
 to direct rays of sun -

The following can be used to
 good advantage -

Pot. Ferricyanide 2.5 lbs
 Ammon. iron citrate 5 "
 Water 40 "
4 minutes exposure, dark blue

Pot. Ferricyanide 2 "
 Ammon. iron citrate 5 "
 Water 40 "
4 minutes exposure, lighter

blue than preceding -

Pot. Ferricyanide 2.25 "
 Ammon. iron citrate 5 "
 Water 40 "
good

a disc of Cu 12 in dia
& abt $\frac{1}{3}$ inch thick
on brass axle was mounted
in frame so as to allow
revoltn its edge being
at sm time introduced
bet mag & poles.

The edge of plate was
well amalgamated for
purpose of obtaining
a good & moveable
contact & a part around
the axis was prepared in
a similar manner -
Combs or Collectors of
Cu or pb were made so
as to Cm in Contact
w/ + edge of + Cu
disc or with other form
of plate hereafter to be
described. These Combs
abt 4 in long $\frac{1}{3}$ in
wide $\frac{1}{5}$ inch thick

Patent the Use of the

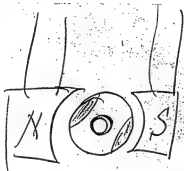
to a Commutator & Brush
for Dynamos & Engine
Commutators with
amalgamated surfaces.

The face of the Commutator
is amalgamated. The brushes
strips wheels etc resting
on the Commutator is
amalgamated, object smooth
down this prevent spark
from roughening Commutator
& brushes & thus reduce of
File processed in

1 end of each strip
 grooved to low of wire
 exact adaption to
 convex edge of plate
 & then amalgamated
 Cu Wires 1/64 in
 thickness attached
 in + ord manner
 by Carvelation to
 the ends of the
 Conductor (see)
 away to the Galvanometer.

England; under head
 improvements in
 Commutators for ~~Eng~~
 magnets & electric machine
 also US patent, 1878
 also in France, Belgium
 & Canada,

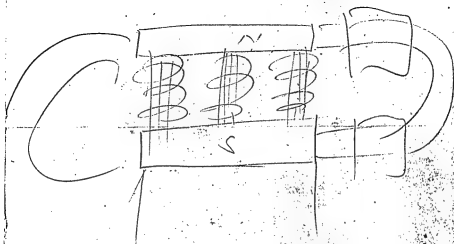
Mention that it is
 preferable to use
 Commutator blocks
 faced with silver &
 then amalgamated.



Magneto-thermic meter

Science Mar 7, 84

Vol III 2057



See Journal Franklin
Institute June 1879
p 39



E. Lewis

May 1879

Plate of metal in mag.
field - flat heated ends.
Current generated.

(Phonoplex 188?)

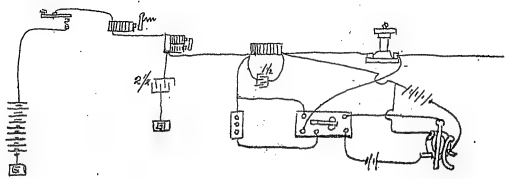
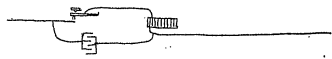
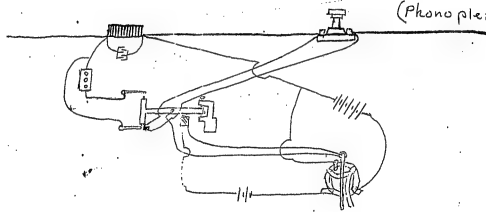
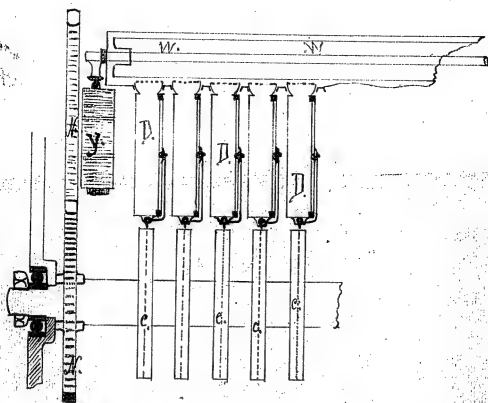


Fig. II.



(1867-01-01)

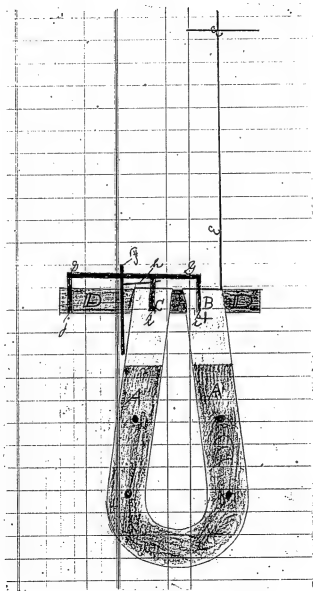


Fig. I.

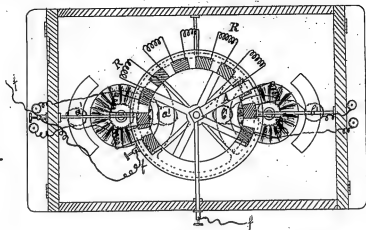


Fig. II.

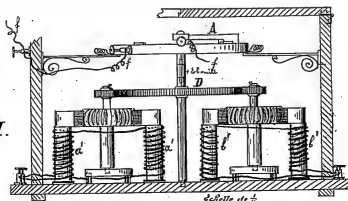
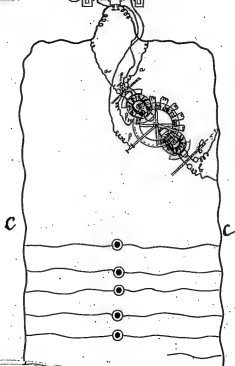


Fig. III.

Machine électrique.



(Electric Light -
Sketches & Notes)

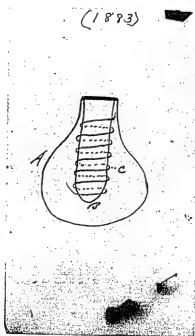
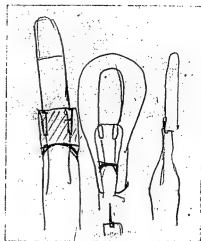
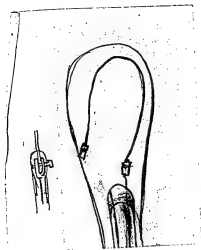
John

Let me know
when you have
the Z commutator
apart and I will
come to the Lab.
to look at it before
sending it to my
office. My address
is Prudential Building - Newark
Wm. Peck.

(1881)

John Ott,

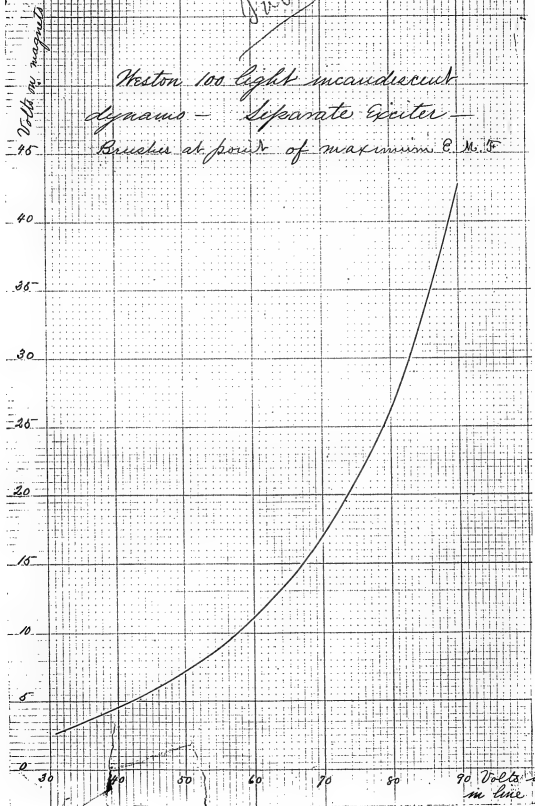
I went ~~and~~ several designs
drawn for forms to Carboys &
fibers in. The present form is too
thick & the fibers slip away &
30 get come out crooked, I
want a form which the fibers
never can get out which will be
easy to get fiber in & which
will put ~~the~~ the same amount
of pressure on ~~the~~ have the same
weight, with a thinner form the
weight would be less but I am
going to put them at angle of
15 deg & this will give
proper strain, object of making
form this is to get more forms in
a cover & not regular to put
5 in a form as now. These forms
I think can be made of plumbago
mixed with ~~oil~~ ^{resin}



Curve

Weston 100 light incandescent
dynamo - Separate Exciter -

Brushes at point of maximum E.M.F.



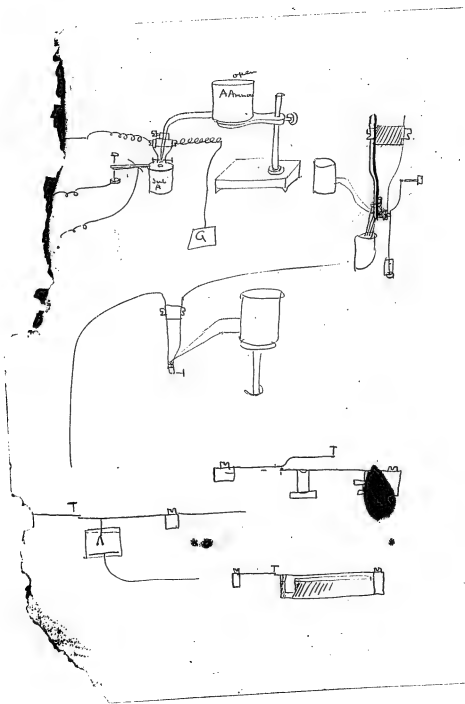
7. Fin. 1894 (1894)
Try cylinder Carbon lead heat
in presence of H₂

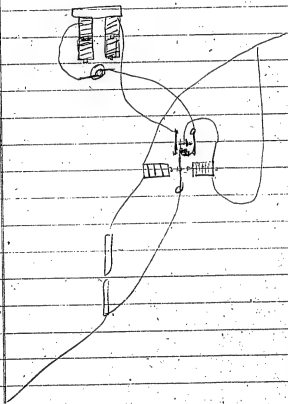
Try cylinder of reduced lead
against a cylinder of reduced
lead peroxidized in the chem way
as prime battery.

Try Chromic acid in Storage bath
Chromic Lead most insoluble of salts

Hyposulphate Soda dissolved Sulphur
try this in Storage ^{+ prime} battery just
a little to keep peroxide from
gelling in it

deposit Carbon in filament
by using vapor Iodoform
spores dense along Carbon
known same as diamond -



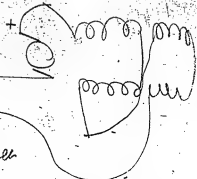
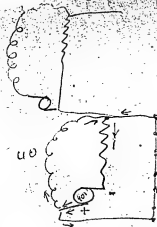


if small coil with 1 ampere =
 of fine ... 10 ampere

M of small of fine =
 40 volts

40
 400
 Fine
 10
 .2

Coarse
 9 = 40 volt
 8 80



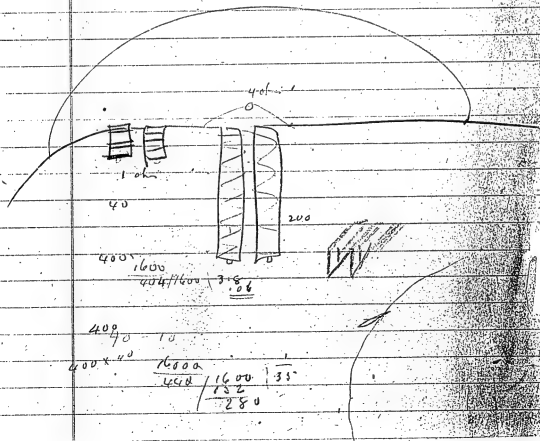
mm mm

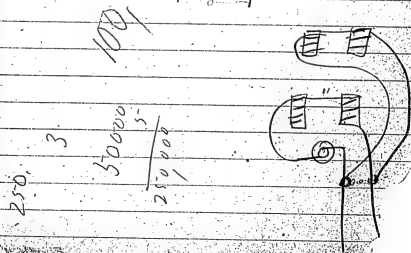
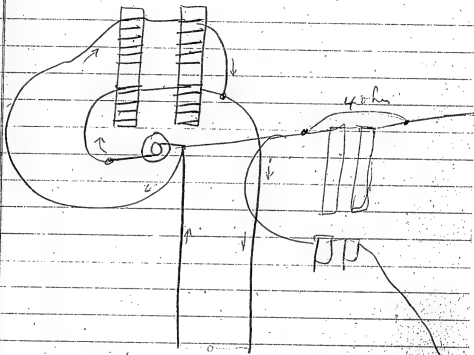
$$\frac{400}{400} = 1$$

$$\frac{1}{10}$$

$$\frac{40}{40} = 10$$

Very short magnets



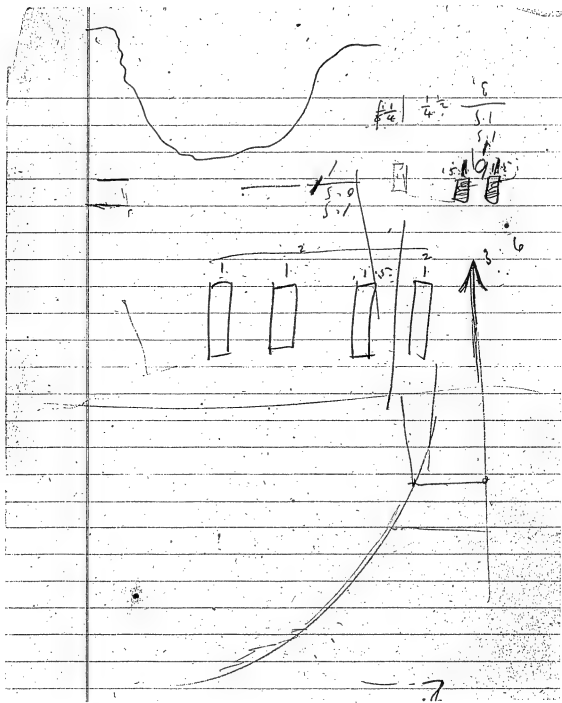


250.

3

30000
5-
250000

100/



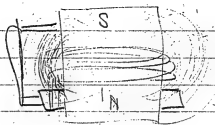
$$\begin{array}{r} 400 \\ 175 \\ \hline 225 \end{array}$$

$$\begin{array}{r} 1350 \\ 225 \\ \hline \end{array}$$

$$1125$$

$$\begin{array}{r} 1850 \\ 225 \\ \hline \end{array}$$

$$1325$$

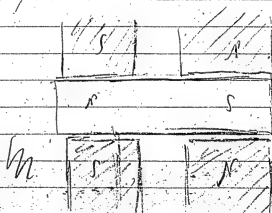
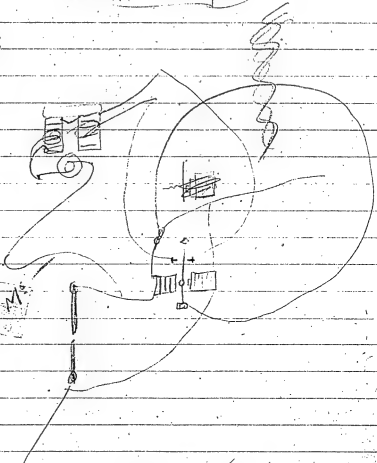


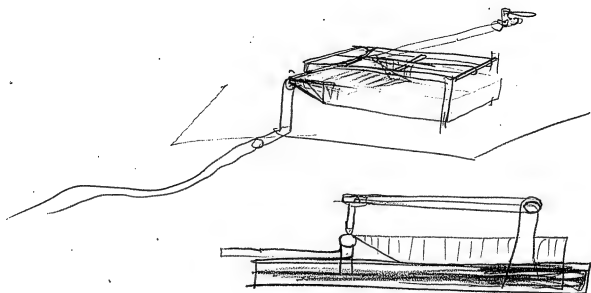
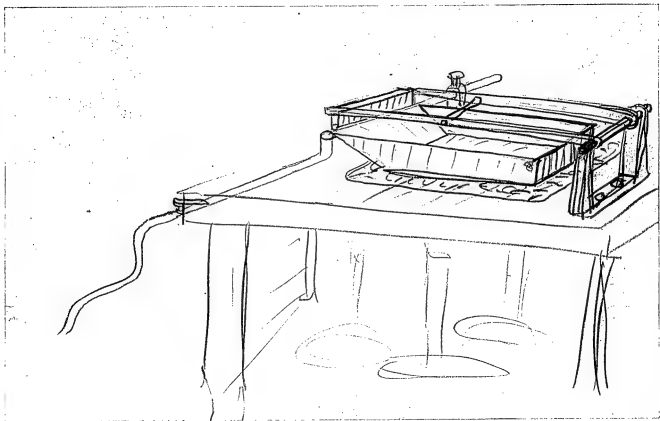
$$\begin{array}{r} 500004 \\ 200000 \\ \hline 300004 \end{array}$$

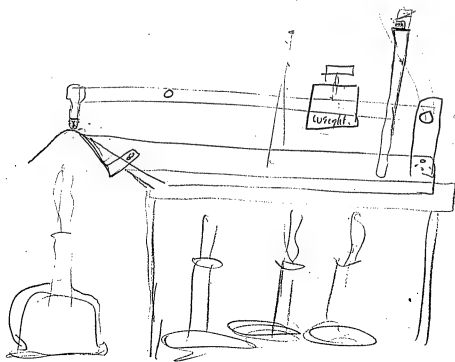
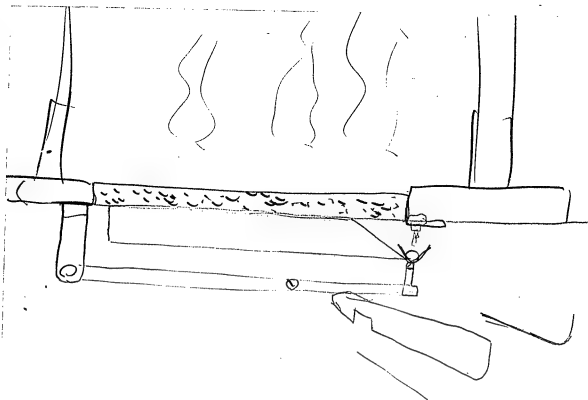
50 Ms
 250
 1000

320

320 200 Ms





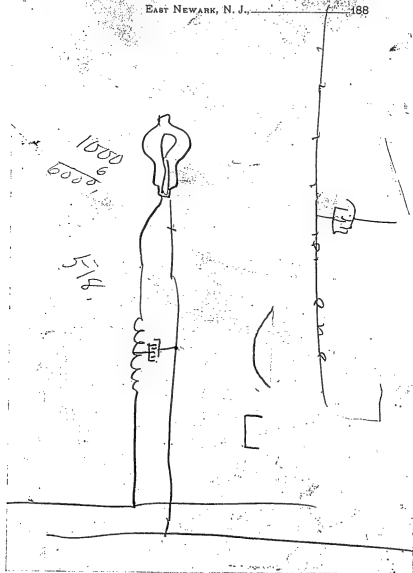


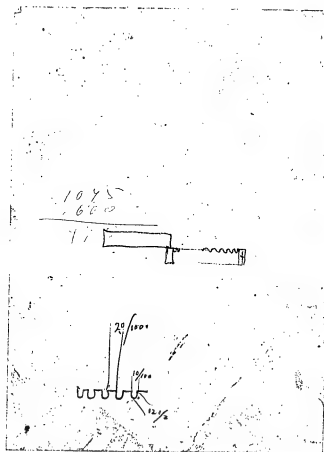
EDISON LAMP COMPANY.

THOMAS A. EDISON, President,
FRANCIS B. UFFORD, Gen'l Mgr & Treas.

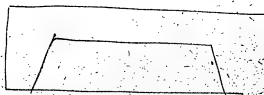
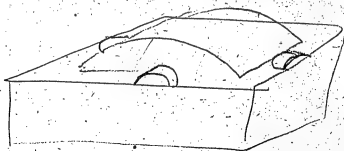
EAST NEWARK, N. J.,

188

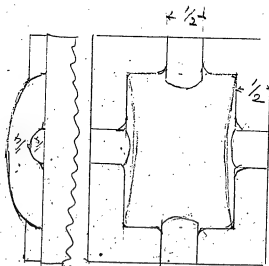


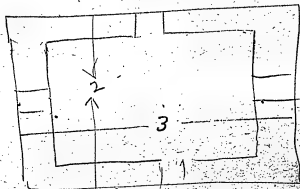
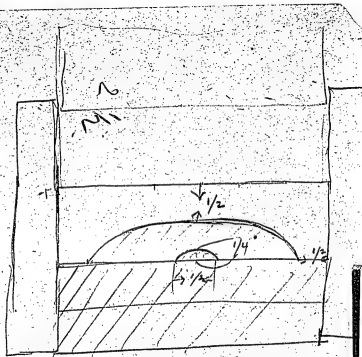


3 x 2 by 1 deep -



No 602





1" deep

9 C

2300.

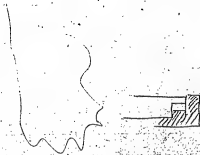
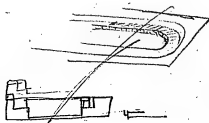
16, 7m'

2000 $\left\{ \begin{array}{l} 12000 \text{ ovs} \\ 6000 \end{array} \right.$

90'



perfectly very thin on baking the
sugar will caramelize & make a
very hard fine smooth skin &
with very little friction for weight.
~~present~~



aconitine.

aconitin-emmonia -

Agar-agar in Bengal Isinglass

thin transparent strips off
scawed - sal white

Mushrooms - squeeze - Easy to
get Cellulose treat successfully
with water break soda-lay

Haf & Alcockal

a paste made of white egg & slaked
lime, sets as hard as stone -
rockets,

Alors

amber softens by heat,

Anchusin or Anchusic, matter from
the Alkanet root softens without
melting

Anemomon $C_{30}H_{42}O_6$

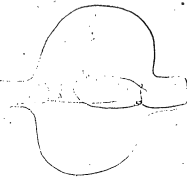
softens $150^{\circ}C$. carbonizes it
from the leaves of Thedemone

arrowroot - good contains 26
pct starch 6 pct woody fibre

Asphaltene, obtained by heating
asphalt 48 hours to $250^{\circ}C$

wholly petroleum is volatile -
black solid strong lustre conchoidal
fracture soft & elastic at $300^{\circ}C$
decomposes before melts

After making some tests
with plates twice as
long plate only 1/2 way



1st test
Copper plates
2nd in 4 squares
white plates
plate

Max 1300
 Reg. 1000 10 cpl
 Cost 14000

1000
 Engr — 3.00
 Groundman — 2.00
 Coal — 4.00
 Oil — .50
 Lamp — 2.00
 Extras — 1.00
12.50
 Rent 1.50
 14.00

10000
 3
30000

30,000

12.
 300
3600

{ Siemens 12-Lights \$200 or \$16.6 per light.
 Our 18 Light 16 A or 32 B. ^{of 20 110 candle} \$160. ~~160~~ 9 "

$$\begin{array}{r}
 18 \overline{) 150} \quad 8.3 \\
 \underline{144} \\
 60 \\
 \underline{54}
 \end{array}$$

$$\begin{array}{r}
 25 \overline{) 285} \quad 11 \\
 \underline{250} \\
 35 \\
 \underline{30}
 \end{array}$$

$$\begin{array}{r}
 12 \overline{) 240} \quad 16.6 \\
 \underline{240} \\
 0
 \end{array}$$

$$\begin{array}{r}
 18 \overline{) 108} \\
 \underline{108} \\
 0
 \end{array}$$

25 Light Siemens \$285 \$11.4 per light.
 Our 18 light 10 of 20 15 of 10 candle 6.4

80 Light Edison 40 of 20 c 40 of 10 \$560 - \$7 per light.
 a 2 Dynamo -

80 Light Siemens - \$1725. \$9 per light

Edison L Dynamo 100 of 20 c 100 of 10 c \$900
 or \$4.5 per light.

Siemens 200 light \$1125 or \$5.6

84. 20

$$\begin{array}{r} 14 \\ 30 \\ \hline 420 \end{array}$$

$$\begin{array}{r} 14 \\ 20 \\ \hline 280 \end{array}$$

$$\begin{array}{r} 54 \\ 25 \\ \hline 1350 \end{array}$$

$$\frac{3}{8} \text{ per hp in } 25 \text{ L min}$$

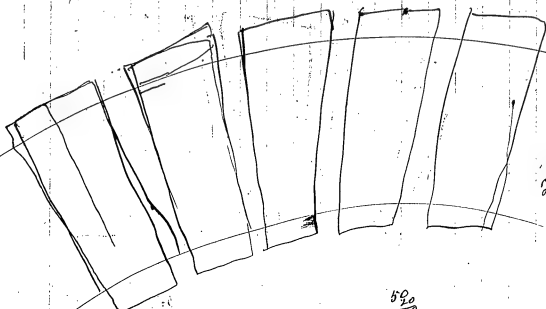
$$\frac{4}{10} \text{ per hp } \text{ per hp } \text{ per hp}$$

$$\frac{6}{10} \text{ per hp}$$

400
81

$$\frac{80}{80} \frac{1200}{420} \frac{151}{80}$$

$$\frac{14}{112}$$



2081.

$$\begin{array}{r} 1875 \\ 3750 \\ \hline 4165 \\ 4165 \\ \hline \end{array}$$

$$\begin{array}{r} 1875 \\ 3750 \\ 1200 \\ \hline 2250.000 \end{array}$$

$$\begin{array}{r} 750 \\ 1350 \\ 1500 \\ 1750 \\ 225 \\ \hline 3300 \end{array}$$

$$\begin{array}{r} 7200 \\ 2500 \\ \hline \end{array}$$

$$\begin{array}{r} 2270 \\ 11250 \\ 12000 \\ 14000 \\ 2250 \\ \hline 150000 \end{array}$$

$$\frac{50}{1000}$$

324 wt
193 dip
~~200~~

750
40 oil cost.
75 work
24 Bricks
250 Lumber
427 Coal
2081

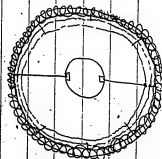
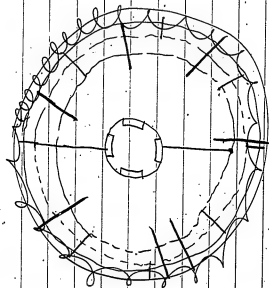
750

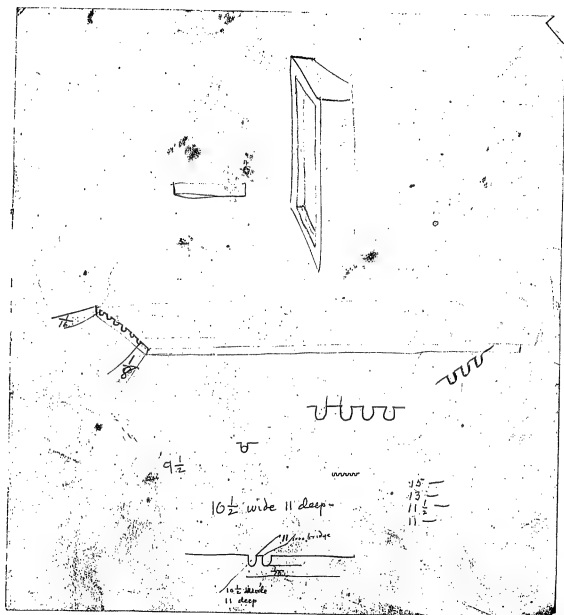
$$\begin{array}{r} 35 \\ 175 \\ 35000 \\ 175000 \\ 190000 \\ \hline 220000 \end{array}$$

$$\begin{array}{r} 250 \\ 1750 \\ 1875 \end{array}$$

4 12

$$\begin{array}{r} 95 \\ 340 \\ 427 \end{array}$$





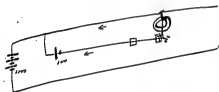
UNBOUND NOTES AND DRAWINGS
UNDATED DRAFTS OF CAVEATS AND PATENT APPLICATIONS

Take about 2 qts Boiled Linseed oil
Boil it down so it gets thick like
heavy Molasses - then take $\frac{1}{4}$ rd
of whole out. Continue boiling till
it gets very thick take another
 $\frac{1}{4}$ out then boil water to amount
turning till it gets nearly
solid - take another $\frac{1}{4}$ out
Boil balance till it gets
like india rubber it will
Suddenly get this way tough
& Canaceous - take it off
before burning - The last $\frac{1}{4}$
 $\frac{1}{4}$ especially the last try
and find a Secret hot or cold

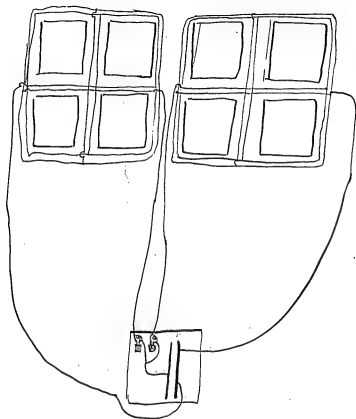
Dyer-
Patent =

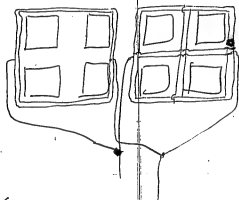
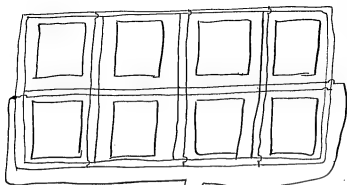
The object of this invention is to increase the economy of Systems of Electric Lighting employing transformers -

The invention consists of main distributing wires with ~~trans~~ the secondary coils of all the transformers on that particular circuit connected in Multiple arc while ~~the~~ the primary wires of one or more transformers are connected to the Central Station by separate wires for instance if there is a main circuit of one mile in length and twenty transformers connected there with all the secondary coils are connected across ~~by~~ the same in Multiple arc while the 1st, 10th & 20th transformers have ~~the~~ one end of the ~~sec~~ primary connected to a wire running to the

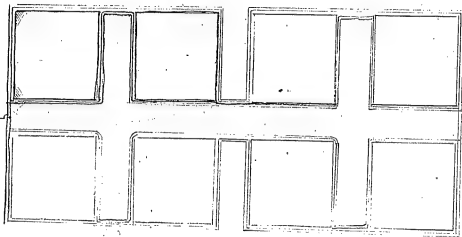


Paint,





Plan



Plan

Plan



object of the invention

Manufacture Carbon ^{conducting} elements
of pure dense Carbon artificially

Value increases, production of high
Carbon power lamps

The invention consists in establishing
an electric arc between two poles of a
battery or dynamo. when the same
are immersed in a liquid or gas
which is decomposed by heat into
Carbon such as Hydrocarbon oils
or carbon combined with other element
and maintaining the size of the arc
constant while Carbon is being deposited
continuously on one of the poles in
the form of a ~~thin~~ ^{thin} stick.
In the establishment of the arc
between g & X a deposit of Carbon
takes place on X and if X is gradually

2

draw away from g by the screw motion so as
to maintain the arc Carbon will be continually
deposited on X in the form of a round
stick about the size of X and this will
continue as long as the arc continues
so that sticks of round homogeneous
Carbon can be made of a several
inches in length, When the required
length is obtained the stick is
broken off & placed in suitable
clamps and a ~~thin~~ thick
deposit of Carbon made on the end
in any of the various ways shown
in my previous patent,

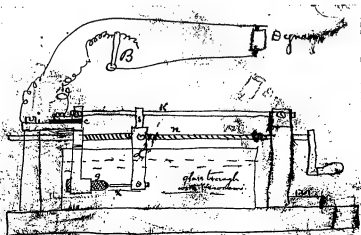
In order that the trough containing
the liquid the apparatus may
be arranged in a chamber
containing through which
gas passes the mechanism
for going into being ~~can be~~
then put in motion by a rod
through a stuffing box in the

Chamber;

It is obvious that expanding
carbonates may be made in
spiral or any form by suitable
mechanism.

Broad claim is ^{new} article info

you notice there is no starting
filament to deposit on but
it is made entirely of carbon
for decomposition of aligned
or green body containing carbon.



K plate
 S carbon
 C screw
 S travel holder and by M
 S guide fork
 K guide
 C insulation
 B spiral metal

The object of this invention is to drive out the moisture ~~of~~ from the globe of an ~~mercurial~~ lamp

The invention consists in heating the globe of the lamp either before exhaustion to a very high temperature or heating it while being exhausted to a high temperature

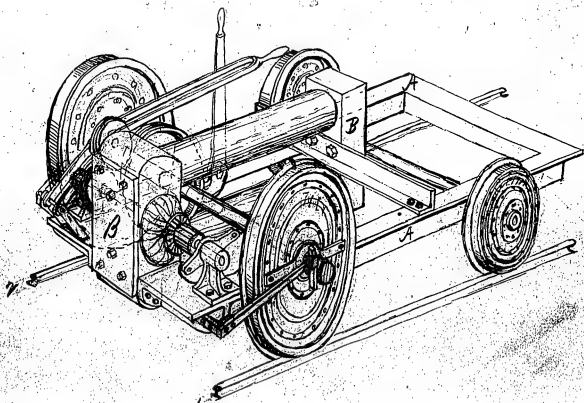
When the lamp is to be heated before exhaustion it is heated equitably over a flame and then immediately sealed thus maintaining an atmosphere free of moisture within the globe until it is to be exhausted when the tip of the sealed portion of the exhausting tube is broken off and it then put on the pump, after being put on the pump it should be

again heated so as to drive out any moisture which might have passed into the globe while connecting to the pump. In this way the phosphoric anhydride used for drying is economized and the ~~first part of the~~ ~~vacuum obtained~~ more quickly ~~is~~ ~~obtained~~ and a better vacuum is obtained.

Claim The method of driving out vapors from the globe of incandescent electric lamps by heating the same to a high temperature, ^{separately or} before and in the act of exhausting the same for the purpose set forth,

RR Car (1872)

Figure 1



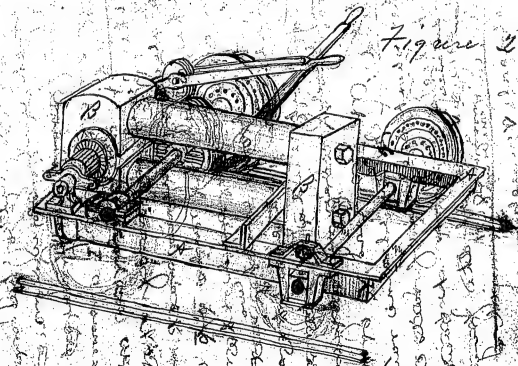


Figure 2.

a

Object to make a better contact between the clamps and the Carbon,

Attained by electroplating the thickened ends with Copper Silver Nickel Cobalt or other easily plated metal which will stand elevated temperatures such as 800 deg fahr or upwards,

When the metal is plated on the carbon it fills every interstice and thus making perfect contact, as the metal in plating contracts and puts great pressure on the Carbon. After the metal has been plated heavily, it can be clamped very tightly without breaking or cracking the thickened end of the flexible incandescent conductor.

The top cell shows the plating of both clamps at once; the thickened ends only being in contact with the liquid.

The second figure shows the plating of one end at a time.

Clamp Plating with nickel or cobalt.

plating the ends of an incandescent flexible carbon conductor etc.

2 lamps same circuit,

The object is to effect a sub-division of a circuit and put of 16 Candles into two or more forming one derivation whose radiating surface or resistance shall be such as with a constant pressure or electromotive force will light 16 Candles or 8 Each or when a greater number are placed in the derivation the total Resistance or a total radiating surface of the whole shall not exceed the total resistance and radiating surface of a single standard lamp.

In this case where two or more lamps are included in one derivation, I use a single circuit breaker, so that all are turned off at the same moment. I have shown a socket combination of two lamps and one circuit breaker,

wait along classes

The ~~base~~ of a non magnetic metal or substance to separate the ^{lower} polar ^{the poles} ~~substance~~ of the field magnets from the iron base for the purpose set on

Claim the use of a number of these in Multiple arc,

Mention

The use of small sizes connected as a dynamo machine the Steam Engine being provided with a governor whose speed can be regulated at will so as to increase or decrease the speed of the Engine motor at will for the purpose of energizing the field of force magnets of a number of larger magnets ~~are~~ Connected in Multiple arc in the light system, the increase or decrease in speed causes a rise or fall of EMF in the Multiple arc system,

B3 Claim.

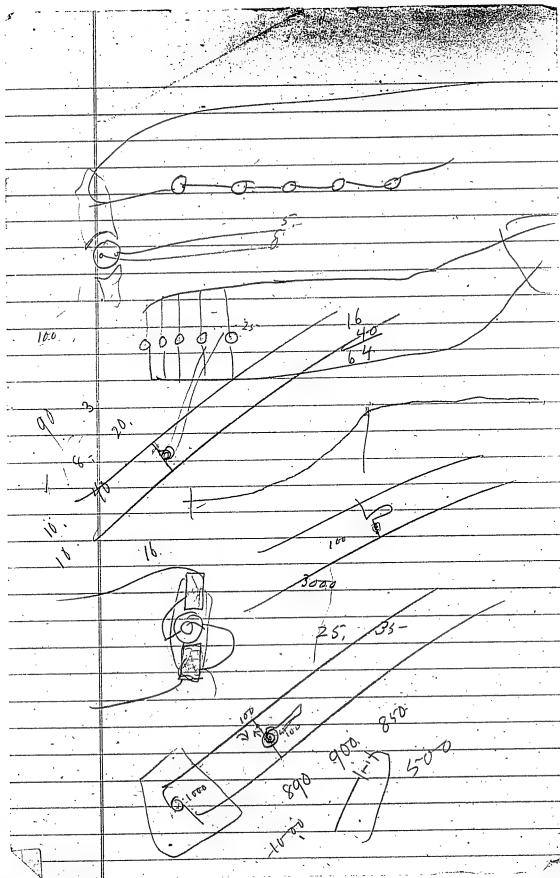
A series of separate electromagnets arranged with one induction bobbin within their polar faces,

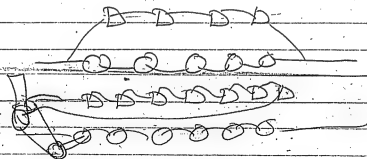
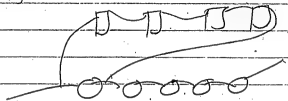
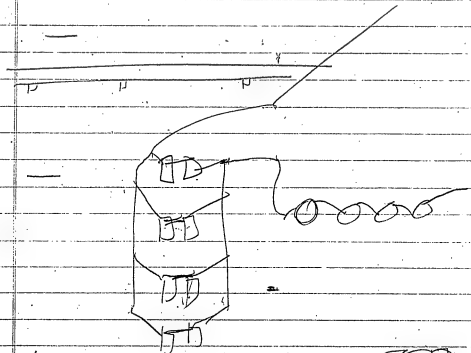
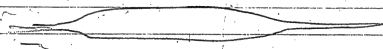
One or a series of electromagnets with an induction bobbin ~~with~~ rotatable within their polar faces, ^{or} the whole of the upper polar faces being fastened to the lower polar faces by a plate non magnetic plate,

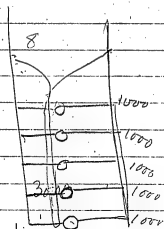
does ^{not} have one thing but it is a steel one

The combination with ^{the shaft of} a magnetic electric ~~motor~~ machine, of the wheel to which the ^{crank} ~~crank~~ ^{pitman rod} of a steam engine is secured, when such wheel or crank is arranged with a balance to balance the effort of the reciprocals of the pitman rod

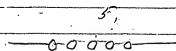
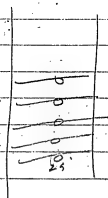
The combination ^{directly} ~~the shaft of~~ with a magnetic electric machine of a high speed steam engine provided with ^{an} automatic ^{variable} cut off governor, all arranged & combined & operated together upon one common base -







2



25

5

101-

Induction power, x water
wheel

~~So~~ To transfer power by means of
Electricity for great distances, ~~without~~
without the creation of costly conducting
wire requires that the current sent
should be of very high electromotive
force, as much as 2800 to 3000 volts,
by the use of these high electromotive forces
a ~~very~~ surprisingly small wire may
be made to carry without insulation
1000000 horse power
for several miles. In practice it
is practically impossible to develop
current of such high electromotive force
from a single bobbin of a machine as
~~it is almost impossible~~ the difference of
potential between one section of wire
and another upon the bobbin is so
great that dangerous currents
take a path & cross & burn the
machine, another difficulty is that
the spark at the commutator is
enormous. By dividing conducting
the machine so that it is provided
with several bobbins & ~~full~~
magnets ~~all~~ upon one shaft
which is rotated by steam water
or other power, The difference of
over

2
Potential between the poles of
each barbin is lessened the
total EMF being divided between
the barbins, hence there is a less
potential between each layer of
wire on each barbin, - By this
distributing the electromotive force
in several barbins all driven
directly by a ~~single~~ shaft
It becomes possible to ~~carry~~
transmit several thousand
horsepower into electricity
and carry the same over a
very small wire to the distant
station.

To energize the field of force
magnet a shunt is arranged
around one of the barbins of
the machine. ~~about~~ the wire upon
all the field magnets forming
a part of the shunt. The resistance
of the field magnet wire is
so proportioned that only sufficient
current passes through the wire to
energize the field magnets to
that point of magnetic saturation.
that is the most economical in
relation to the current. It is
obvious that one of the barbins

May be entirely disconnected from the main line and the ~~current~~ so propounded upon it that it will give sufficient current to energize all the field magnets.

At the receiving station the ~~apparatus~~ machine is composed of several bobbins, and the field of force magnets energized by a current as at the receiving station, or a special bobbin may be disconnected from the line & the current used from it to energize the rest of the field magnets.

I have found, that the receiving motor should have its bobbin wound to give one half the less electro-motive force as the transmitter when both are driven as transmitters so that when the receiver must run at nearly twice the speed of the transmitter when doing no work, and when doing its work at the same economic running faster or as fast as the transmitter. It has been the practice heretofore to make the receiving machine ~~run~~ ^{give} the ~~exactly~~ over

the machine is wound to give one half the less electro-motive force as the transmitter when both are driven as transmitters so that when the receiver must run at nearly twice the speed of the transmitter when doing no work, and when doing its work at the same economic running faster or as fast as the transmitter.

4

Notes by
C. J. ...

Like the handmilling machine, add
back work to it ~~but~~ it gives half
the speed ^{for the same} ~~of the~~ ^{electricity} ~~the~~ ^{handmilling} ~~the~~ ^{gives}
The maximum effort, but not the most
economical ~~of~~, but if ~~the~~ I have
added this ~~principle~~ ^{principle} inasmuch as,
I ~~make the machine~~ ^{make the} ~~run~~ ^{run} ~~twice~~ ^{twice} ~~cheaper~~
to ~~run~~ ^{run} as the handmiller, and
add work sufficient to bring abt
Coulomb's ~~electricity~~ ^{electricity} ~~to~~ ^{to} ~~run~~ ^{run}
75% or 80 per cent of the ~~force~~ ^{force} ~~of the~~ ^{of the} ~~handmiller~~
force of the handmiller.

I will mention that at the Reading
Station that the machines
may be divided up and
placed at different points
but all of its ~~6000~~ ⁶⁰⁰⁰ ~~connected~~ ^{connected}
in series, when the machine is
divided up a separate
small ~~6000~~ ⁶⁰⁰⁰ ~~field magnet~~ ^{field magnet}
wound as a ~~sign~~ ^{sign} ~~is to be~~ ^{is to be}
connected & driven by the
main shaft which is driven
by the ~~6000~~ ⁶⁰⁰⁰ ~~in the main line~~ ^{in the main line}
the separate ~~6000~~ ⁶⁰⁰⁰ ~~as before~~ ^{as before}
mentioned is to energize the field
of ~~force magnet~~ ^{force magnet} ~~of the main~~ ^{of the main}
line ~~6000~~ ⁶⁰⁰⁰.

Say that a very small induction bobbin & small field magnet, maybe arranged so as to

Say that upon the same shaft as the large bobbin a small subsidiary induction bobbin may be placed with its subsidiary field magnets connected as a dynamo. The whole current of which so made to pass through the large field & force magnets to keep them ~~at~~ ^{the} electro-motive force of the large induction bobbin constant.

~~The use~~ We form the induction bobbin on an iron or steel sleeve or tube which is slipped over the engine shaft & keyed or otherwise fastened to it

The ^{combination of} use of a bobbin of a magnet electric machine with an auto ^{variable} cut of engine rotating the shaft upon which the bobbin is placed and

is proportioned the size and weight of the bobbin to the speed of the engine that the former will act as a fly wheel with the best effect

Any that ^{wire} ~~have~~ ^{coils} ~~are~~ ^{one of} the field
magnets may be connected in series
with the wire coils of the other field
magnets or the whole of the coils
may be connected in multiple arc.

Claim,

Several bobbins & their field
force magnets, on one shaft,

2nd Energizing the field magnets
by one of the several bobbins by
a derivation from one bobbin,

3rd Proportioning the resistance &
excitation of all the field of
force magnets so that with the constant
electromotive force of one bobbin
that the current will flow through
all the field of force magnets
to saturate the magnets exactly to the
most economical point,

4 The use of a distal & separate
bobbin disconnected from the main
line by rotation in the same shaft
other bobbins to energize its
all the other field of
nets

claim abnormally great diameter
between parts of the inner
shall be met while the shaft
is turned as when a magnet

0.02

6. The method of obtaining a rapid rotation of the shaft by using a slow moving water wheel to pump water to a higher level to fall in a ~~not~~ quick revolving turbine connected to the shaft of the Electric machine,

7. ~~The method use of a pressure~~
In a system of transforming power by Electricity the use of Reversing motors, which shall give a lower Electromotive force ~~than~~ ~~related~~ than the dynamo when rotated at the same speed,

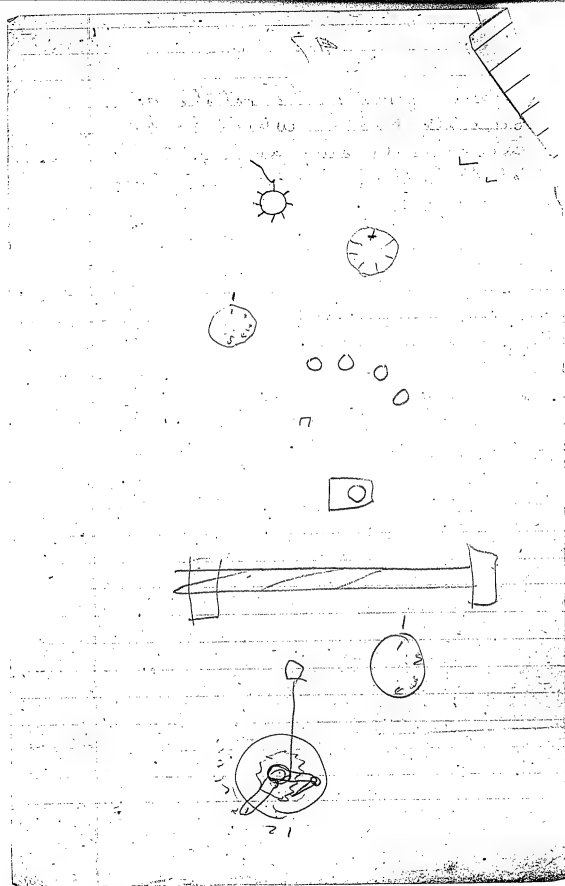
8. In a system of transforming power by Electricity the use of Reversing motors with a load so proportioned that it shall not ~~exceed, or~~ cause it to be reduced in speed ~~by~~ to slow a point where it will give a Counter Electromotive of at least 60 per cent. of the dynamo ~~ing~~

9. The method of ~~in~~
the feed of ~~to~~
the ~~reversing~~
the ~~34~~



47

Receiving motor to rotate a
separate Babbin which babbin
energizes its own and all
of the other field of Bwan
magnets,



Case No. 11.

The object of this invention is to regulate the energy of the field of force magnets of a series of ~~Dynamo~~ Faradic machines and to regulate the amount of Energy given to such ~~Dyn~~ Faradic machines.

The invention consists of a Dynamo machine, ~~rotated~~, by a steam engine provided with an automatic variable cut off governor for supplying current to the field magnets of a number of Faradic machines.

The invention further consists in providing such governor with a device whereby the speed of such steam engine may be increased or diminished at will.

A is the steam dynamo machine, which is provided with a Porter Allen governor. The speed of the engine being increased or diminished

Case No. ②

by increasing or diminishing the position of a weight Q from the fulcrum P . at which point there is a wheel R working a screw S which serves to draw the weight Q to or from P .

The Faradic machines $B C D E$ are also ~~also~~ driven directly by a steam engine with automatic variable cut off governor but the governor is not usually made regulatable a given number of revolution being decided upon the governor is set to give the exact number ~~while~~ But owing to ^{the} rise & fall of electro-motive force are the main conductors 1 & 2, due to ~~putting on and~~ connecting & disconnecting lamps & motors it is essential that the ~~same~~ electro-motive force should be prevented from rising or falling beyond a certain point & this is attained by manipulating the governor of the steam engine of A which in its

Case H. H.

turn regulate the strength of
the magnetic fields through
which the bobbins of B
C D & E are rotated.
I have shown the field of
force magnets ~~also~~ connected
in series. But they can also
be connected in multiple
arc from the Dynamo A.
3, 4, 5, 6 are subsidiary
~~also~~ Multiple arc circuits
in a house, 10 is the meter.
7 an electromotor 8, 9 & 10
Electric Lamps -

Claim.

Regulating the EMF at Central
Station by increasing or diminishing
the speed of a steam motor
by driving a Dynamo by
means of its governor

Etc

Etc

Case K R.

(1)

The object of this invention is to measure the ~~electric~~ quantity of electricity or electric energy used upon a closed circuit in any given time.

The invention consists in suspending ^{by means of a spiral spring} an electrode within a cell containing a liquid such electrode being preferably of Copper & the liquid of Sulphate of Copper and inserting in such cell another electrode. Both the suspended & fixed electrode ~~being~~ forming the poles of a derived circuit from the circuit wherein the energy is to be measured, and measuring the strength and amount of such energy by the effect of the deposit of Copper taking place on the suspended electrode causing it to move an index finger over a scale after the manner of an ordinary spring balance.

Case KK (2)

The invention further consists in causing the downward movement of such suspended electrode to actuate contact levers for closing circuits containing devices for recording definite increments of deposited copper - so that a continuous record may be obtained.

A is the Electrolytic Cell.

B is a Copper Electrode.

Suspended from the spiral spring D by an arm carrying an index finger E.

F is a circuit closing lever.

Closing at G when the deposit on B is at a maximum & on H

when the deposit is at a minimum.

The amount of deposited Copper being read off from the scale when the arm F is in contact with E.

~~#~~ I is the Apparatus for Counting each deposit and for reversing the direction of the flow of the current after the Counting takes place,

Circuit K

(3)

~~The~~ K is the Counter.

L the lever which serves to work the Counter at each reciprocation, and which also serves to reverse the Current through the Depositing Cell by the usual Current reversing device O.

P. Q. are the main wires.

~~The Energy of which is the~~
Current circulating in which is to be measured.

~~The operation~~ R is a Coil which is given such a resistance that only a definite fraction of the Current passing will be deflected through the Meter.

4 + 5 are the wires leading to the reversing spring & 5.

1 + 2 are the other poles which are connected to the Electrodes B C by the wires 2 + 3. ~~The same~~ When the lever L is on one side the Current passes through the Cell in one direction while if it is on the other side the

Case K.

(4)

Current passes through the Cell in the opposite direction.

S is a Resistor to weaken the current passing from the main line through the actuating magnets M.N. The other ends being S & T which passes to A & H respectively while the other portion of this circuit is formed by the arm E & W see 1. The operation is as follows. When the lever L is in such a position that the current is from ~~A to B~~ the electrode C towards B. Copper is deposited upon B and it gradually passes downward in the liquid by the increase of weight. When it reaches downward near the limit of its motion the arm E strikes the lever F & carries it in contact with the point G. This closes the circuit through the magnet N. for an instant the lever L is drawn over to the other side the direction of the flow of the

Case K K (3)

Current through the cell being reversed so that Copper is taken off of B & deposited on C. this lightens B ^{at the} ~~at the~~ ~~lever~~ until the lever F places the lever F in contact with the point H. when the current is again reversed by the magnet M being energized and the Electrode B again receives a deposit & sinks & this goes on incessantly = ~~of~~ Every movement or reversal being counted by the action of the lever L upon the Counter K.

~~Knowing the amount of current actually in the main current~~

R.R. is a resistance of Copper wire of such an amount that it will increase its resistance to the passage of a current by rise of temperature in the same proportion as the electrolytic fluid decreases its resistance for such rise or vice versa when there is a fall of temperature

Fig. 2 shows a plain
indicating meter useful
where but one or two lights
are used, ~~The Resistor~~
The two Electrodes being
connected directly to the
Ends of the Resistor
R. ~~which is~~

Claim.

Can't say in view of our
previous case —

Case L.L.

The object of this invention is to ~~prevent~~ modify the action of momentary currents of higher electromotive force than that normally present in my system of distributing light & power from central stations

It has a further object in preventing as far as possible the blackening of the glass vacuum chamber of Carlanum; the incandescing filaments by Carbon deposited thereon by electrical carrying

The invention consists in protecting the lamp again ~~higher~~ momentary electromotive force by putting a Condenser ^{there} across the multiple arc circuit between ~~the~~ lamps in each house & the main conductor

The invention further consists in placing on the socket or holder of each electric

Case LL

(2)

Run a sharp magnet of
presenting such polarity to
~~upon the side of the~~ the positive
side of the carbon filament
that it will attract the
highly Electrofied Carbon
Vapor downwardly to the
Clamps instead of allowing
it to be deposited upon
the glass. This it will do as
an exceedingly weak magnet
will deflect ^{the stream of electrofied} it in any
required direction.

In fig 1 is shown the
main Connections A.B.
with two wires c & d leading
from the service Box C.
The wire c passes through
the meter & across the
wires d & e is placed a
Condenser P. which serves
to absorb ~~force~~ or reduce
the rise of Electrostatic force.
The condenser might be
replaced by a secondary
battery. The Lamp G.
shows a magnet N.S.
attached to one side of

Part I (3)

of the glass chamber

This is more clearly shown in
fig 2 N - S. is the bar
magnet placed on that
side of the carbon filament
connected to the positive pole.
It will mention that a coil of
wire with a current passing
through the same will attract
or deflect the stream of electrified
carbon.

Claim.

The Condenser or Secondary
battery for the purpose

The Use of a magnet in
connection with an incandescent
Electric Lamp for
modifying or affecting
the action of electrical
Carrying

Edison give me some notes
on Dynamos, proportions,
relations re, with a view to making
an effort to secure electric
abnormally large field magnets.

Ideas -

You can claim a ^{Comb} single electro magnet as
described with a cylinder having its
surface entirely covered with wire.

A field magnet whose weight is
4 or more times greater than the
bobbin =

A Magnet formed of Cylinders
having an abnormal length & dia
with pole extensions sub as described
in Comb with a cylinder entirely
covered with wire;

A magnet whose length is 2 or more
times the diameter of the induction
bobbin -

A magnet field of low ^{magnetic} resistance
over

We should somewhere claim
working the field magnet of a
Dynamo by including it
in a multiple arc circuit =
was 1% do this =

is claim = would be the same with
abnormally large field magnets
2 or more times in length than the
diameter of the bobbin; of a
rotating iron cylinder made of
thin discs of sheet iron

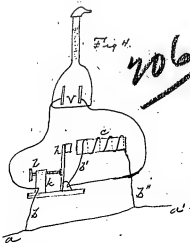

You know all the other fellows, us.



I use a single pole - Wilde used some some
but he had old Siemens armature - flat magnet
not round = prof Rowland says round armature give
maximum effect for given current.

177

Exp. 3988 of 78-



"Figure 4 represents the electro-magnetic volta-meter, and is a portion of the conductor 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100."/>

In conjunction with this electro-magnet is an automatic make-and-break piece. It is a volta-meter 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100."/>

Noting a current passes through the conductor a magnet will necessarily be a difference of potential force between the points b and a, the current which will be that an electric current will be made to circulate through the coil and magnetize the soft iron core. The bar magnet to which is attached to a spring will have an upward and a little normal position and break the contact at b between the soft iron core and the bar magnet. The bar magnet will then no longer be attracted and will fall back to its original position and the contact, vice versa. The volta-meter 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100."/>

approximately proportional to the quantity of electricity which has passed through the conductor and a.

From this I found that the length of the conductor (the amount of electricity passing through which is to be ascertained) a device an circuit having a volta-meter fixed up in it. The resistance of the circuit must be very much greater than that of the length of conductor from which it has been obtained. The resistance of the volta-meter and conductors being fixed the quantity of electricity passing through the volta-meter will consequently have a fixed ratio to the amount passing through the conductor. On this manner with

a graduated tube the height of a column of liquid can be measured and so the quantity of electricity passed can be ascertained.

Batch time together (1) Batch time out

The object of this invention is to produce a rapid vacuum and to provide for a cheap and rapid method of proving the perfection of the Carbon loop before it is finally sealed in the glass globe of the lamp.

As it is practically impossible to produce ^{loops} of absolute uniformity or homogeneity or to Carbonize the same absolutely uniform, many have shown when heated to redness, spots which are either less red or of a bright red or in cases where there is a bad fault ~~which is~~ a white incandescence and as these bright red spots determine the life of the lamp, as well as effects is noticeable. It is ~~become necessary~~ to prevent the destruction of so many ~~Completed~~ To prevent these difficulties Carbons from being entering as parts of a Completed lamp to be afterward thrown away thus ~~very~~ increasing the cost of manufacturing of the remainder ~~at~~ a previous preliminary heating which can be made rapidly & cheaply thus saving the disadvantages of completed lamps & reduces the cost of manufacturing.

50761

Q is the glass holder which is subsequently sealed to the glass globe at the Bulge R. a is the Carbon to be proved; ~~the~~ B is a soft rubber cork through which the glass holder passed - d is a small bottle holding mercury. Connected to the neck of the tube C. by lowering this the mercury passes ~~downward~~ into the neck & overflows the cork thus sealing it & preventing ingress of air to the chamber C.

Fig 2 shows the complete apparatus. c is the Carbon C the chamber. x is a stop Cock closing a tube which connects with a large exhausted chamber f. having a capacity many times greater than the chamber C. This chamber is kept at a high exhaustion by the Sprengel drop tube H. There being several of these connected to f. These drop tubes get their Mercury from a pipe K leading from a reservoir. & the Mercury falling passing in a tube P leading to a Mercury well. The Hg of the well being pumped back (over).

~~by the~~ To the high reservoir by
steam or other power by means
of a pump =

It is a McLeod gauge for measuring
the degree of exhaustion an apparatus,
which has been described in other
application made by me relating
to the subject -

~~The~~ After the Carbon holder
with its cork has been placed,
in the Chamber. C. The Cock X is turned
and the air rushes into the Exhausted
Chamber, & producing still a fair Vacuum
in both sufficient to allow of the
immediate raising of the Carbon
to redness by the current, when the Carbon is
proved the cock is turned and the
several springs, el. bring the vacuum
up to its original Exhaustion by the
time another Carbon & holder is
inserted in the Chamber. C.

Claim, proving Carbons before final
manufacture lamp =

The Exhausted chamber with a small
mercury pump in Carbon with the liquid
to be exhausted - The stopcock best,

(1)

11/7/77


The object of this invention is to obtain ^{manufacture} ~~manufacture~~ strips of ~~flexible~~ ^{flexible} woody fibre in proper shape for Carbonization for use as incandescent conductors for electric Lamps.

Woody fibre with parallel fibres - such as cane Bamboo or bast fibre from the bark of the Palm makes the best material for this machine, strips are cut longer & thicker than desired from the bamboo cane, and these are drawn through the apparatus fig 1. h is the strip & the shaving knife of the guiding edge, & n the limiting screw which abuts against W - ~~thus~~ this screw is adjustable and can be so set that the strip can be accurately shaved to any required thickness, accuracy in sizing is very essential to obtain an equal resistance & radiating surface & uniformity of resistance along the entire length when the strips are Carbonized, after the strips have been sized as to thickness they are placed Edgewise in the ~~steel~~ ^{bottom} ~~cutting~~ ^{holder} tool fig 4 and the ragged Edges shaved off so as to come flush with the face of the steel holder along its entire length. It is then taken out and the straight edge is placed downward ^{on the top} in the steel tool & shaved so that ^{the top face} ^{thickens} the ends the finished Over

Strip is shown in fig 5. the slots
on the end are for the purpose of
holding the ends of the ~~strip~~ ^{filament} in
the carbonizing mould, a hole may
be substituted, a wire being placed
in the slit or hole - This hole after carbonizing
^{is to be removed} for the screw of the clamp to
pass through. If the ~~carbon~~ ^{filament} is to be
very thick & sometimes ~~draw~~ ^{draw} the it
is necessary to have the ends thicker
than the body of the filament as
well as used to obtain this result
is draw the strip through the shaving
machine fig 1 twice or thrice as
thick as I intend the filament to be
I then cut it as before described
but in this case it ~~will be~~ the
filament will be twice or thrice
as ~~thick~~ wide as broad to bring
to square I lay it flat in another
cutter exactly similar to fig 4,
~~but~~ & shave it flatwise the bottom
of where the strip lays being less deep
than in the regular cutting machine.
It is obvious that the bottom edge
of fig 4 may be of any shape
the top edge of 4 may also be of any shape.

mention this case is not to be taken
to cut the filament parallel with the strip

off the carbon

Claim:  (that kind of an end)

2nd ~~Bamboo~~ filaments made of Bamboo or
Cane family or the fibre of leaves or other
woody material ~~whose fibres are~~ whose fibres are
parallel, =

3rd - The method of accurately sizing
by shaving -

4 The method of cutting fibres in
shape by cutting in shaving in
slit the holders,

5 A ~~Bamboo~~ filament provided with
a slot or hole in the end for holding
the end stationary while being carved

4 for widening the screw of the clamp
to pass through when ~~carved~~ placed
in the clamp; ~~to~~

6 The ends having a greater width &
thickness than the body of the filament,

7. Cutting filament parallel with their
fibres.

(1)

The object of this invention is to produce filaments of carbons of ~~different~~ uniformity in shape and of equality in Carbonization. Nickel plates are used within which are grooves, into which the ~~the~~ filament of wood is placed, ^{2 in. long} ^{enough of the} The filament is secured to the plate at X by means of a platinum wire passing through a hole in the enlarged end of the filament, a ~~wire~~ wedge a is also placed beside of the end of the filament the platinum wire passing through both, the other end of the filament is secured to a nickel or platinum clamp c and rests in the bottom or at the extremity of an enlarged part of the groove. When the nickel plate ~~is~~ is covered by another nickel plate placed in a nickel chamber & subjected to ~~low~~ ^{low} heat sufficient to nearly Carbonize the filament. The whole gradually contracts in length and as the end at X cannot move the clamp end ~~drawn~~ ^{drawn} to the clamp c is drawn ^{until this end is a trifle shorter than the} ^{other end}

62
The exact position to place the
End X so that in the contraction by
Carbonization the two ends shall
be exactly opposite when fully
Carbonized is a matter of experiment
and depends ~~on~~ greatly upon the
nature of the Carbonizable material
in this plate the filament is Carbonized
Edgewise in fig 4 the two ~~ends~~
thickened ends are laid flat
in the grooves & small weights are
placed thereon to keep them down,
a ~~contraction~~ chamber C is provided
in which the filament d can
contract, which it does nearly approach

Fig 4 is a modification of the
plate shown in fig 1 except the ends
are laid flat instead of ~~flat~~
Edgewise, a small weight being
placed on the ~~end~~ lower end & the
upper end prevented from moving by
being fitted into a space of ~~the~~
size & shape of the thickened end
In fig 8 & 9 the ~~ends~~ filament is
laid flatwise and are covered and
held in place by two weights.
The filament itself is held in place
by a weight ~~the~~ ^{filament} when the ~~ends~~ contract.

It moves the weight X towards the end of the plate B. The effect of the filament to move this plate causes a tension to be placed in it while carbonizing hence the resulting loop is perfect in shape.

If the filament is very thick the ends may have holes through them as in fig 1, 2, and a pin passed through them securing them to the plate & heavier weights used to keep the ends perfectly flat which is essential to the effect perfecting clamping electrical connection between the clamps in the lamps and also to prevent the breaking off the ends ~~of the~~ by the clamps should they not be flat.

Claim, The method herein described of manufacturing uniform ~~carbon~~ ^{Carbon} conductors for electric lamps, by securing one end in a definite position ~~in relation to the other end of~~ ^{Carbonization so that the other} end shall when the whole is carbonized be opposite the other ^{bus}.

2. The method of keeping
the enlarged ends of the
filaments flat when carbonized

3rd. The method of Carbonizing
filaments of Carbonizable Material
under tension so as to secure
a Carbon Conductor of uniform

4. The method of Carbonizing
filaments by placing them
in grooves in metal,

Etc,

A —

Cam 242

Object is to obtain an incandescent lamp (with a flexible carbon of high resistance) for giving light in a line (i.e.) a long narrow line of light.

The mechanism consists of a long straight flexible carbon secured to clamps which are connected to wire which ~~are~~ pass ~~ed~~ through & are secured in the glass and a glass upright within the vacuum chamber for supporting the upper part of the carbon filament.

The wire passing to the upper part of the carbon filament is secured to the upright by ~~the~~ melting the glass of the upright at intervals, & it may be secured in various ways. The carbon being flexible will bow out & in ~~the~~ by expansion & contraction without breaking.

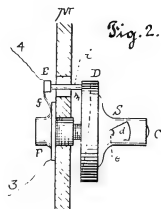
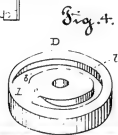
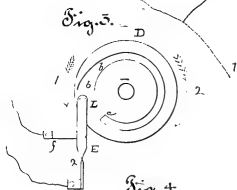
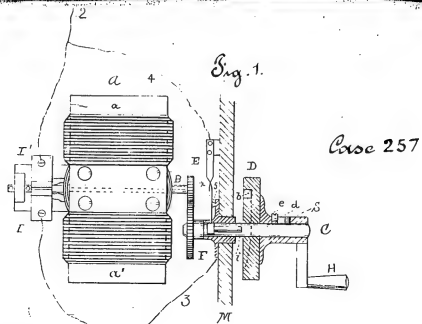
~~Dr. J. J. Thomson has used a short inflexible carbon which generally was destroyed in a short time by the contact between the electrodes the carbon destroyed by the effects~~

over

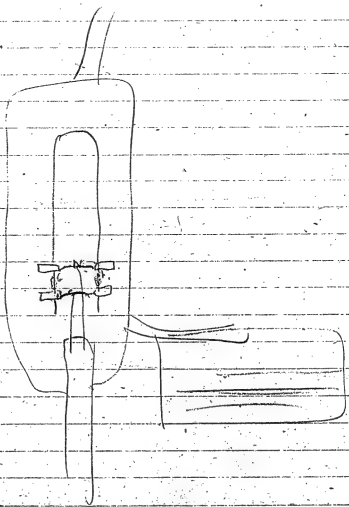
of Expansion & Contraction which
~~resists~~ ~~when~~ the lamp was
lighted.

~~All~~ the defects of breaking the carbon
or ~~also~~ causing a bad contact
~~there~~ between the clamps & the
Carbon is entirely avoided by
making the same flexible &
consequently of high resistance.

C



line
260
2



Kocher - Jelly glass in two glass parts
screwed together by numerous bolts.



Dalby - Lean a jar with loose cover and
gasket, the piston chamber, which
has exhausts, when air suddenly
admitted. Cover held by a spring, but
may be additionally secured by
screw band.



Raymer - Put lead pipe in stopper of
can, sucks out air with mouth,
squeezes pipe together, cuts off
pipe and then fuses or solders
it end.



Trissler - Exhausts by pump through
lead pipe fused over hole in
can top, squeezes pipe together,
cuts it off and fuses end.



Hunt - Same as Trissler

Elliot - Fills jar with water,
exhausts water and vacuum
it to drive a stopper bit
sent, which stopper is
afterward made additionally
tight by wax.

Ex 20 or 21 of 74.



Device for transporting
volatile liquids such as
ether. Vessel coated &
filled with another ether.
Cork forced in, and neck
pressed against together
above cork by blow
pipe flame.

3/4

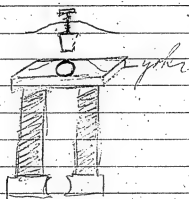
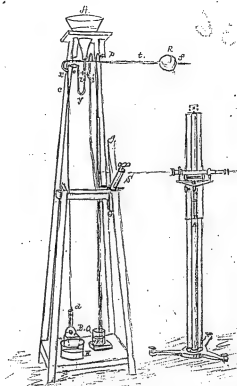
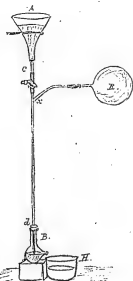


Fig. 1.



Case E E (1)

The object of this invention is to deposit Carbon at any desirable spot upon a filament of Carbon for lighting by incandescence.

The invention consists of first exhausting the air by a mercury pump from an electric lamp provided with a bulb containing solid crystals of naphthalin ~~then~~ heating the same after a high vacuum has been obtained so that it will be thrown into the vacuum in the form of a gas then concentrating by focusing the heat of the filament or an electric arc upon that part of the Carbon filament which it is desired to deposit Carbon. If for instance the deposit is required to be made at the clamping electrode the focus is placed thereon & the deposit takes place. ~~The deposit obtained by this means afterwards the lamp is sealed off and is ready for use.~~

Case E F. (2)

G is the mercury pump.

A the Electric Lamp

D the reservoir of solid
Crystals of Naphthalene, which
may be heated by the lamp.

E F is the arc & reflector.

throwing the rays on the
reflector C. Which focus
it upon any desired part of
the Carbon. B. = The lamp
after being finished is sealed
off at X. One or two crystals
of Naphthalene may be placed
in the bottom of the lamp to
supply the waste of Carbon
due to Electrical carrying
which it does whenever by
long burning of the lamp
sufficient heat is conducted
from the filament to the
glass & downward by
conduction to heat the
Naphthalene,

Case E E (3)

Claim

The method of depositing Carbon by focusing a source of energy -

9/10 The Use of Naphthalin or other Volatile Carbon Compounds that is ~~not a solid~~ solid at ordinary temperature

The use of a small quantity of solid Carbon Compound within the exhausted chamber of an Electric Lamp for ~~not~~ continuously supplying Carbon

Case B13.

The object of this invention is to make the resistance of Carbons filaments used in Electric Lighting by means of an other resistance.

The invention consists in previously shaping Carbonizable matter in proper form Carbonizing the same under tension so as to retain its shape, and then measuring their resistance to the passage of a current ~~and then~~ ~~the~~ Their resistance is then brought reduced in such a manner that all shall have ^{nearly} the same resistance, after treatment a mould is formed similar to the shape of the carbon conductor to be heated. This mould may be either of Nickel platinum or Carbon preferably the latter as it can be cut out of paper & Carbonized in such a manner as to retain its shape, within the mould replaced a number of Carbons and ~~pass~~ a gas capable of decomposition by heat & depositing Carbon is

passed through the mould while the same is ~~used~~ kept incandescent by the Electric Current. The Electric Current not being allowed to pass through the Carbons to be deposited upon. The length of time the mould is kept incandescent will determine the degree of deposit of Carbon and the consequent resistance of the Carbons upon which the deposit takes place. This is soon ascertained by experiment the high resistance Carbons requiring a longer time than the low resistance Carbons.

In fig 1 ~~A B~~ B' C' BC is the mould. B' B the bottom & C' C the cover. ~~within~~ within the mould are the several Carbons to be acted upon. d' ~~is~~ is the inlet pipe for the gas & d the outlet pipe. when the gas has passed for some time the current is passed through the mould by the pillars L & K and it is brought to the proper degree of incandescence.

Case BB. 3

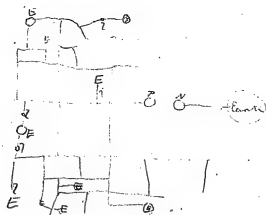
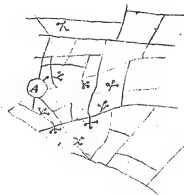
to decompose the liquid used ~~was~~ and this is continued until the ^{proper} Resolance of the Carbons is attained which must have previously been ascertained by Experiment.

Afterwards the Carbons are taken out & either put in place.

It is not essential that gas should be passed through the mould as ^{an infinitesimal amount of} solid crystals of Naphthalene may be enclosed in the mould before heating and the Cover may be dispensed with if the mould be placed in an enclosing Chamber entirely free from gas filled with the gas to be decomposed,

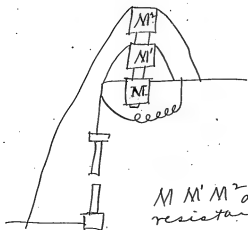
Fig 2 shows a top view of the mould. Fig. 3. and end view.

Claim, Method of evening the Res of filaments of Carbon by the deposit of Carbons upon them by the action of heat as set forth,



5

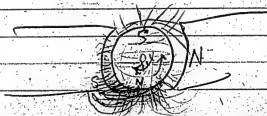
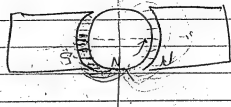
31.8.5.1.

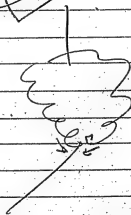
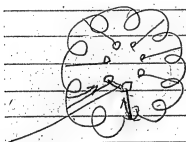
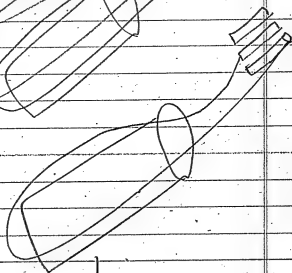
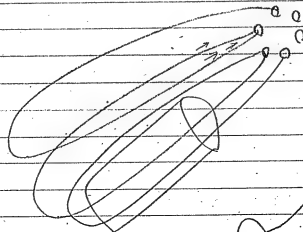
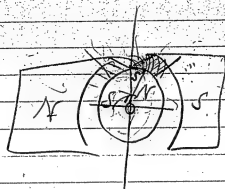


$M M' M^2$ all of same resistance.

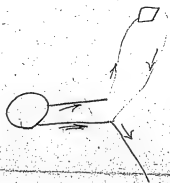
M^2 wound in opposite direction from M and M'

5.17 Spark due to cutting lines
made by the magnetism of
core due to current. This
increases with load
at this lines constant.





6.5



"
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Company of New York
65 Fifth Avenue

New York

188

The object of this invention is to obtain a
economical and reliable meter adapted for
measuring the amount of Electrical
Energy consumed in any system of
Electric Lighting =

to which this relates is more particularly set forth in my application ^{in patent}
The invention consists in using amalgamated
Electrodes in the depositing cell,
~~in the case of a depositing cell~~
~~to the end that no action~~ from one of
the electrodes the metal is taken and
deposited upon the other electrode
by the action of the current,

By the use of amalgamated electrodes
a much weaker current will

produce a ^{more} correct deposit of metal
than ^{is possible} with copper electrodes

thus permitting of the use of a ^{much smaller}
Resistance in the main line and

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Company of New York
65 Fifth Avenue

(2) New York, 1888

thus causing a saving in ^{Electrical} Energy =
The Electrodes which I prefer to use and
which are the most accurate are of
Metallic Zinc, ~~all~~ both placed in a
strong solution of Sulphate of Zinc,
and connected with the wires of the
system precisely in the manner shown
in my application or patent of record,
and I prefer that such Electrodes
before being used in a cell the meter should
first have a heavy coating of
deposited Zinc placed on them by
the action of a current & thoroughly
amalgamated while being deposited
plates thus prepared are precisely
alike and give accurate results,
Other metals which can be amalgamated
such as Cadmium, Lead Tin, are capable
of being used in this connection when

when immersed in the ~~sulphate~~ solutions
of their ~~sulphate~~ salts, not acting upon
the mercury such as the sulphate of
Cadmium, Acetate of Lead, but
none are so accurate as Zinc treated &
operated as described. an wire resistance
is placed in the same shunt as the cells and
arranged to compensate for the rise or effect on
the ~~variation~~ in the resistance of the cell, so that the
total resistance of the shunt shall always be the same.
Claim

The use of an electro depositing
cell provided with ~~the~~ amalgamated
metallic plates, for determining the
strength of the electric current which
passes through it.

The Use of amalgamated Zinc Electrodes
in an electro depositing cell for determining
the strength of the current passing through it

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Company of New York.
65 Fifth Avenue.

(4)

New York

188

3 = The ~~the~~ combination with a
definite & known electric
resistance in an circuit of a shunt
circuit around such resistance
containing ~~a~~ one or more electrodepot
cells having amalgamated metallic
plates for determining the strength of
the current in the main circuit =

Same claim but with zinc plates ~~amalgamated~~

A meter for measuring the current in any
multiples ~~and circuits~~ electric circuit
consisting of a ^{known} resistance in such
circuit, around which is a shunt
circuit, containing one or more electrodepot
cells ^{with} amalgamated electrodes and resistance
for compensating for the effect of temperature
on the resistance of such cells =

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65, Fifth Avenue

New York, _____ 1888

Dyer =
Did we get in that last
English meter & on the Continent
that thermostat device for keeping
temperature above 50 Fahr if
~~not put in the the application~~ show
that, using same drawing as US,
Want to take out Continental &
English on this new deal as it settles
the meter biz =

Dip in sul. acid
 then in mere
 deposit in
 Sulphate of
 Zinc-amalgamation
 Dip again if
 deposit is thick

LOCALITY

APPLICANT

NO.

356

With copper ^{Caritum.} traces from
so 100 B. 100 of a salt

Anal. zinc about 1000 salt

Made no acid

Anal. zinc used in battery

Zinc plates dont average when
taken out

Copper dress Caritum

quartz copper electrode

sub. bath of copper de posits

Caritum in solution

Too of a salt with blank

PATENT SERIES, 1879-1886

The Patent Series for 1879-1886 consists primarily of material relating to Edison's domestic and foreign patent applications. The documents appear on the microfilm in the following order: (1) Patent Application Files, (2) Patent Application Casebooks, (3) Patent Application Drawings.

(1) The Patent Application Files contain patent applications and related drawings, along with correspondence between Edison's attorneys and the U.S. Patent Office. There are eleven extant case files for the period 1879-1886 in the archives of the Edison National Historic Site. Seven of the files relate to patent applications that were subsequently rejected by the Patent Office or abandoned by Edison. The four other files pertain to issued patents. A related set of application files for Edison's U.S. patents can be found in the National Archives (Record Group 241, Records of the Patent Office). This set, which is also available on microfilm, is nearly complete. For this reason, only the files relating to Edison's abandoned or rejected applications have been included in this microfilm edition.

(2) The Patent Application Casebooks contain copies of the claims for Edison's U.S. patent applications for the period 1878-1884. Only the claims from abandoned and rejected applications have been filmed.

(3) The Patent Application Drawings consist primarily of tracings from the drawings that accompanied Edison's patent applications. Only the tracings from abandoned or rejected applications have been filmed.

The archives of the ENHS also holds a small number of case files relating to Edison's foreign patent applications for the period 1880-1886. Most of this material concerns Canadian applications, but there are also files dealing with the patenting of inventions in Great Britain, France, Germany, and Sweden. In addition, there are a few other patent-related documents, primarily patent assignments, in Italian, Norwegian, Portuguese, Spanish, and Swedish. Some of these assignments involve the transfer of rights from Edison to the Edison Electric Light Company of Europe, Ltd. These documents have not been filmed.

Patent-related materials for 1879-1886 can be found in most of the other series on the microfilm. Applications and caveats relating to the electric light occasionally appear as exhibits in the civil court records and the patent interference cases presented in the Litigation Series. Several volumes in the Notebook Series contain drafts of applications and caveats, while notes that were made preparatory to the filing of patent applications can be found in the technical scrapbooks and among the unbound notes and drawings in the Notebook Series. The various "Patents" folders in the Document File Series contain patent assignments and patent-related correspondence, as well as a few unbound applications and caveats. A set of Edison's English patents for the period 1872-1880 has been filmed in the Charles Batchelor Collection (Special Collections Series).

A complete set of the 1,093 U.S. patents issued to Thomas A. Edison can be found in *Thomas A. Edison Papers Microfilm Edition, Part 1*, reels 1 and 2.

Patent Application Files

These files contain patent applications and related drawings, along with correspondence between Edison's attorneys and the U.S. Patent Office. Seven of the files relate to patent applications that were subsequently rejected by the Patent Office or abandoned by Edison. The four other files pertain to issued patents. Only the files relating to Edison's abandoned or rejected patents have been filmed. A nearly complete set of application files for Edison's issued U.S. patents can be found in the National Archives (Record Group 241, Records of the Patent Office).

The following case files have been filmed:

- Case 202 Electric Lights and Systems of Electric Lighting (filed February 5, 1880)
- Case 237 Dynamo or Magneto-Electric Machines (filed August 9, 1880)
- Case 592 Electric Generators (filed October 10, 1883)
- Case 663 Railway Signalling Apparatus (filed February 16, 1886)
- Case 665 Telegraphy (filed July 10, 1886)
- Case 674 Telegraphs (filed July 16, 1886)
- Case 704 Systems of Electric Distribution (filed December 6, 1886)

The following case files have not been filmed:

- Case 186 Electric Lamps (issued as U.S. Patent No. 223,898; this file contains an application for correction of the patent)
- Case 386 Incandescing Electric Lamps (filed August 7, 1882; issued as U.S. Patent No. 358,600)
- Case 433 Electric Railways (filed August 7, 1882; issued as U.S. Patent No. 448,778)
- Case 463 Apparatus for Translating Electric Currents from High to Low Tension (filed August 14, 1882; issued as U.S. Patent No. 278,418)

Abandoned Patent Applications, Case 202
Electric Lights and Systems of Electric Lighting
(filed February 5, 1880)

Serial No. 218

Thomas A. Edison

Llewellyn Park, N. J.

Electric Lights and Systems of Electric
Lighting.

- Patented February 5/80.
3 Rejected March 30/80
Amended April 20/80
Rejected Sept. 20/80
4 Argued Dec. 9/80.
Rejected Dec. 10/80
Amended July 26/82
Rejected Sept. 10/82
Additional affid. Oct. 10/82
Amended Sept. 12/82
Rejected Nov. 5/82
Amended Nov. 5/82
Rejected Nov. 5/82
Amended Feb. 2/88
42. from A. Feb. 16/88
Amended Feb. 20/88
43. from A. Feb. 27/88
44. Letter & affid. forwarded March 9/88
45. from A. March 27/88
Amended June 12/88
46. from A. June 20/88
Billiard in Court Mar. 8/90.
Hearing April 15/90 - 1230 A.M.
Remanded to Summary term April 16/90.
Rejected April 16/90
Amended April 17/92.
Rejected April 18/92.
Amended May 5/92.
Rejected May 9/92.
47. Appeared to Remand. May 10/92.

32. Remanded to Remand
May 13/94 - 2. Mar.

33. Appeal argued Mar. 29/94
34. Conf. for trial May 26/94
35. For writ as to the 12, 3 not
raised as to d. b. - June 1/94

36. Amended - June 7/94.

37. Rejected June 8/94. (withdrawing)

38. Rejected June 12/94.

39. L. to A. & Arg. - Jan. 29/95.

40. L. for A. - Feb. 7/95.

41. Appeal R. 17 A. 11/95 - Feb. 25/95.

42. Appeal held to be dead under
Supreme Ct. decision Apr. 27/95.

Hang
down
1st. Case
Abandoned

Case 202

Fig. 7.

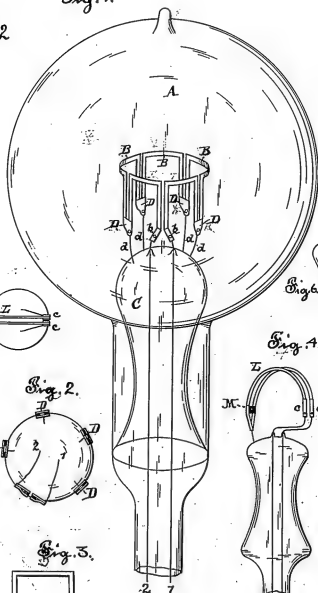


Fig. 5.



Fig. 2.

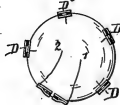


Fig. 3.



Fig. 6.

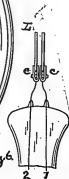
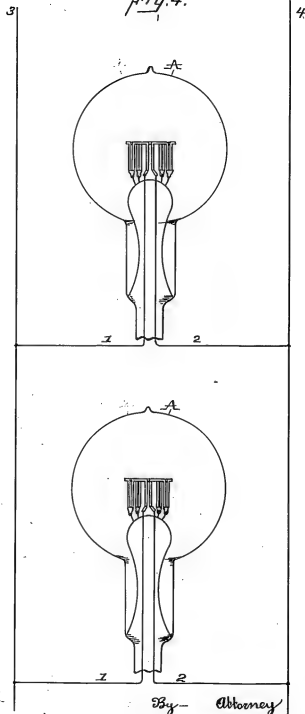


Fig. 4.



Fig. 4.



Witnesses.
S. C. Fowland

Inventor.

By Attorney

Filed Jan 30th 1888
S. C. F.

Room No. 118

All communications should be addressed to
the Commissioner of Patents.

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D. C., Mar. 30th, 1880.

Thos. A. Edison
Glen Ave. & Hillbu
Washington D.C.

Please find below a communication from the EXAMINER in charge
 of your application No. 2180 for a Patent for Improvement in Ele.
Single & System & Ele. Single filed Feb 5th, 1880.

Very respectfully,

H. E. Paine.

Commissioner of Patents.

The specification of this application is ambiguous. From the statement of invention it appears that applicant proposes to maintain the light giving surface the same while the resistance is to be increased by a diminution of cross section thereof. In the latter description of the device by reference to the drawings the light giving surface appears to be increased in the same proportion as the resistance, and further the resistance is increased by a proportional increase of length of light giving body. It is further not understood from the description how the conductors

may be diminished in size by increasing ⁽¹⁾
the resistance of the lamp. The claims
in view of the indefinite description are
rejected as being vague

2
Mach 30th/80

Edison No 202
Mile Appen 2180 of 1880
Thomas A. Edison
Electric Light System re Room 118
filed July 5th 1880.

How coming interest

The Office letter of March 30th 1880 in the above noted case has been received. The letter is in error in saying that "it appears that applicant proposes to maintain the light giving surface the same while the resistance is to be increased by a diminution of cross section thereof".

Mr Edison asks a patent for the mode of utilization of a certain discovery, the discovery of this law in electric lighting by incandescence. That as the resistance of the incandescent ~~conductor~~ ^{material} is increased, the resistance of the conductor ^{thereby} from the source of energy may be increased, that is that the size of such conductor, hence the mass of metal required thereof, may be diminished.

For example, Fig. 4. Effect of increasing the radiating surface is ~~diminished~~ not increased but the resistance is, not by "diminution of cross section" but by elongation

over

^{and resistance}
 surface, be increased in the same ratio,
 causing a given amount
 of light, that the conductors thereto
 from the source of energy need not
 be increased, that is ~~the~~ ^{the} conductors
~~be~~ ^{are} adapted to 100 ohm lamps
 of each pair, with a definite radiating
 surface, a certain candle power of
 light, if the radiating surface ~~is~~
~~about~~ and the resistance be doubled
 the candle power will be doubled
 but there need be no change in
 the conductors " ^{over}

As seen ^{from} this it
 is submitted that the ~~first~~ ^{first} claims
 should be allowed, ~~especially~~

Attorneys for Edison

April 20/50
 Answered

"Erase" the size of the conductor in
 street mains is proportionately increased
 in line 889 was for 4 of apc = 3 in
 "the size of the conductor" therefore
 remaining the same as for a
 lamp of only one fifth the radiating
 surface, resistance and candle power
 of this one, in other words the size
 of the conductor being proportionately
 less than would be required for
 five lamps each having one fifth
 the resistance of the one here
 illustrated"

Receipt No. 152...
 All communications should be addressed to
 "The Commissioner of Patents,
 Washington, D. C."

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D. C., Sept. 20th, 1880.

Thos. A. Edison

Care Dyer & Kilber

Parsippany

Please find below a communication from the EXAMINER in charge of your application

No. 21,880 for a Patent for Improvement in System of
Electric Lighting filed Feb. 9th, 1880.

Very respectfully,

E. M. Marble

Commissioner of Patents.

ELECTED.

This case has been reconsidered
 in connection with amendment and
 argument filed Apr. 20th 1880. It does
 not appear that applicant has discovered
 any new law with regard to dynamical
 electricity and the resistance of conductors.
 It is a well known law that when the
 circuit is closed a definite amount of
 heat is produced throughout the entire

circuit, and that the heating effects in various parts of the conductor are directly as the resistance of those parts. It is an obvious deduction from the above that an increase of resistance in the work may be attended by an increase of resistance in the conductor, and should be if the object be to maintain the same proportionate resistance between the two as originally existed so that there shall be some absolute expenditure of energy in each. Under such an increase of resistance it is of course further necessary that an increase of electromotive force in accordance with the law $C = \frac{E}{R}$ should be had in order that the "current" may be the same, and the total heating effects the same. These are all matters of calculation simply to be determined by the nature of the particular case, and in accordance with well known laws.

The specifications of this case contain simply an enunciation of these well known

facts and applicants alleged invention is reducible simply to the well known laws or the corollaries thereof, that in order to the most economical production of heating effects, the resistance in the work should be as large as possible in proportion to the resistance of the entire circuit, and that a generator of high electro-motive force should be used. Reference may be had to Ganot's Physics by Atkinson, N. Y. 1877 pages 709 and 710 and to Deschanel's Physics, N. Y. 1877, Section 371.

The alleged invention is held to involve simply a question of degree in the matter of resistance of lights and conductors, and hence not to be patentable.

202.

1.

C. V.

Edison Case # 202.

Serial No. 2180.
E. A. Edison.
"System of Electric
Lighting."
Filed February 5, 1880.

In the
U. S. Patent Office.
Room 152.

Hon. Commissioner of Patents.

The rejection of September 20, 1880
has been carefully noted.

We start out with the objection that
"it does not appear that applicant has
discovered any new law." - We are
not aware that an applicant to be suc-
cessful must have discovered a new law,
we believe the Patent law would not pro-
tect him if he had. It does however
aim to protect the man who first applies
a known law to a useful end.

We think we are safe in saying that
but two new laws have been embodied in
electrical patents in the past ten years.

More inventions were only the embodi-
ment of these known laws, in means to
an end.

We claim nothing more for the present
application

We deem it hardly profitable to go into

2.

extended argument on this point in answer
to the long Argumentative rejection, but feel,
unless references can be given, that we must
insist upon the allowance of the application.

Attorneys for Edison

Dec 9-1880

Room No. 132
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

[2-071.]

Case 202

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D. C., Dec 15th, 1880.

J. A. Edison
Care Dyer and Wilber
Present

Please find below a communication from the EXAMINER in charge of your application

No. 21,50 for a Patent for Improvement in Electric
Lighting and System of Electrically Feb. 5th, 1880
Lighting

Very respectfully,

Emm Marble
Commissioner of Patents.

The above named application has been further considered, and the objections of the former office letters under date of Sept 20th are reiterated. The alleged invention or discovery is held to involve nothing more than the carrying out of well known laws, and differs from other devices of the same kind only in degree. The application is again rejected.

2180

Electric Light & System of Electric Lightening

May 5th, 1880Dec 5th, 1880

Erase all of specification and
claims after 11th line, it - manuscript
page and substitute:

By a definite area of radiating
surface of definite resistance, raised
to a definite temperature, a definite
amount of light is the result, a definite
amount of electricity of a definite
electromotive force being required & required
the conductors or means being proportioned
to all these conditions.

I have found that if the resistance
of the translating medium be increased,
its radiating surface remaining the
same, the same definite amount of light
will be produced, and the conductors

diminished in size in proportion to the increased resistance; an increase of electromotive force being required, proportionately much less however than the increase of resistance.

For example, figures for illustration only, assume that all the lamps in circuit have incandescing conductors of 100 ohms resistance, that 1000 lbs of copper conductors are used in circuit and that 100 volts of electricity is required to keep the lights; if now without changing the radiating surface of the incandescing conductors we raise their resistance to 200 ohms each, pressure of 140 volts will be required to give the same luminous effect but the conductors may be reduced one half, 500 pounds only being required, that is while the resistance is doubled, an increased electromotive force of say only forty per cent is needed, while but one half the original outlay for main conductors is necessary.

As a sequence to the above, if the radiating surface and its resistance be increased in the same ratio, the

is doubled, giving double the light, the mass of conductors taken from the source of energy need not be increased if the electromotive force be increased about forty percent.

These facts are utilized in this invention, so adjusting the relations existing between radiating surfaces, their resistance and the conductors from the source of energy, that economy in first cost and in cost of maintenance may be subserved.

And this, that systems of electric light economically used even in sparsely settled localities where the number of consumers is few in comparison to the area and further that means may be provided for lighting at main cost highways or streets where there are few if any consumers, and it is desired to lay conductors singly or in pairs for the necessary street lights.

And the invention consists in the method hereinafter more fully described and claimed and in the novel form of lamp necessary therefor, which is

illustrated in the drawings accompanying and forming part of this specification.

Figure 1. is a perspective drawing of the arrangement of many carbons in one lamp for increasing its resistance.

Figure 2. a plan of the carbon connections and

Figure 3. a single carbon thereof.

Figure 4. is a perspective view of a double resistance carbon, while

Figures 5 & 6 are plan and side views respectively thereof.

In figure 1. A is the enclosing globe and C the incandescent conductor supporter as shown in prior applications. Several incandescent conductors B, each of the standard resistance are taken and united at their ends in a series by conducting clamps D, the terminal ends of the series connecting to clamps E, to which are attached the conductors 1. 2.

This series is supported upon C in circular form by wires or other supports d. d. d. In this case the current entering by 1. traverses one carbon and passes by

lamp D. to the next and so on through the series to conductor L.

As each incandescent portion B, is of standard resistance and gives a standard light, the effect of this arrangement is to group a number of such lights, in this Figure 5, and to light a much larger area than would one, at the same time the total resistance of the lamps being proportionately increased, the mass of the main conductors therefore remaining the same as for one lamp of one fifth the radiating surface, resistance and candle power; in other words the mass of the conductors being proportionately less than would be required for five lamps, each of one fifth the resistance of the one here illustrated.

There is consequently great economy in the laying of the main conductors therefore, while the number of street lamps is lessened, and it becomes commercially practicable to light sparsely settled streets and suburbs.

In Figures 4 & 5, strip D of carbonized material is taken, of standard resistance

for a given length, but of twice the ordinary length and doubled upon itself.

At the point of binding back is an insulating block B, so that the parts are kept electrically apart. To the free ends, which are in close contiguity to each other, are attached the clamps etc. and conductors &c.

As shown each inner contiguous surface is hidden by the other, so that the total radiating surface is only the ext. portion, which is equal to the total surface of an ordinary or undoubled carbon, but the increase of length has doubled the resistance, hence there is double resistance with unchanged radiating surface. This double resistance however enables a smaller amount of conductor to be used, the amount of metal in this instance being diminished half.

This ability to diminish the amount of metal in conductors is of great importance, as in many instances, notably in thinly settled localities, it may determine the practicability of a system of electric lighting. It also enables localities far distant from

202
7

a central station source of electric energy, to be supplied with electric energy for purposes of light and power, as in ordinary conditions, under any conditions which may be required, for as it happens, the first cost of conductors and the cost of maintenance would have insurmountable obstacles.

What I claim is:

First: a new system of generation, distribution and translation of electricity for purposes of light, the method of diminishing the amount of wire required in a given length of wire conductors by increasing the resistance of the sample, and so on, as described.

Second: An incandescing electric lamp consisting of a filament of carbon bent back upon itself, the two portions being kept apart by an insulating block and each serving to obscure the light from the contiguous surface of the other, substantially as set forth.

202
8 Third: In an electric lamp an incandescing conductor formed of a filament doubled upon itself so as to increase ~~double~~ the resistance while practically maintaining a uniform radiating surface substantially as set forth

Fourth: An incandescing electric lamp having central or a series of carbon filaments, each of the standard resistance and radiating surface of a system, joined at their terminals into a series, substantially as set forth"

While technically there has been a second rejection in this case, none of the letters of rejection have discriminated between the method and the device claims, and it is a matter of doubt whether the rejections are to apply to all or only part of the case.

In view of this we request permission to make this special amendment, rewriting the specification, in order

202
9

to present the matter more clearly and
unambiguously to the Office.

T. V. Edison

per J. T. Miller

his Attorney

July 26th 1882

(2-071.)

Room No. 91
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D. C. Sept. 13, 1882

J. A. Edison
R. N. Dyer
Lear

202

Please find below a communication from the EXAMINER in charge of your application
No. 2185 for a Patent for Improvement in Electric Lights
filed Feb. 5, 1880

Very respectfully,

Emmabelle

Commissioner of Patents.

ELECTRIC [101-50,000]

The material of which the insulating block "b" is made should be stated.

The statements on the "b" fr. should be somewhat modified as the one part of the conductor is not entirely hidden by the other.

The 1 claim is informal, it being for the construction of the device or rather for the conception of the

manner of constructing the device or system instead of being for the system itself. Furthermore a method must form a part of an art & not of a system.

The 3 claim is not understood as applying to anything described in the case. What is meant for instance by a "uniform radiating surface".

The 4th claim is met by Kouns' Eng. Pat. #3809 of '92.

6

(8)

6/13/12

40-2
Lancet

Thomas A. Edison

Electric Light and Systems of Electric Lighting

Filed Feb'y 5th 1880

Ser' No. 2180 (Edison No. 202)

To the Comm'r of Patents:

Sir:

In the above
entitled case I submit the following:

On 3rd page of amendment dated
July 26th 82, erase the last three lines
and insert — novel form of lamp
by which the advantages before set
forth are obtained, the same being —

On 4th page, same paper, erase de-
scription of figures 4, 5 and 6.

Same paper, erase commencing with
2nd line from bottom of 5th page down
to and including 19th line from top
of 6th page.

Erase claims and insert

~~First~~: In an incandescing electric
lamp, the combination with the en-
closing globe, of two or more arch or
loop conductors supported within
such globe and all connected to-
gether in circuit so as to be light-
ed simultaneously, substantially
as set forth.

Second: In an incandescing electric

lamp, the combination with the in-
-closing globe, of two or more arch or
loop conductors, supported within such
globe and connected together in
series therein, substantially as set
forth.

Third: In an incandescing electric
lamp, the combination with the in-
-closing globe, of two or more arch
or loop conductors supported within
such globe and arranged in a
circle therein, substantially as
set forth.

Fourth: In an incandescing electric
lamp, the combination with the in-
-closing globe, of two or more arch
or loop conductors supported within
such globe and connected by clamps,
and wire supports from such clamps,
substantially as set forth.

Cancel figures 4, 5 and 6 of the draw-
-ings.

Notice is here given that
the construction shown in these figures
will be embodied in a division of
this application.

Respectfully

Edw. A. Dyer

Att'y for Edison

Dec 17th 1882.

(2-071.)

Room No.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D. C., Nov^r 5th, 1884.

J. A. Edison

Care. B. A. Dyer

#65 Fifth Ave N.Y. City

Please find below a communication from the EXAMINER in charge of your application

No. 2180 for a Patent for Improvement in Systems of Electric
Lighting filed Feb. 5, 1880.

Very respectfully,

Benj. Rutterworth

Commissioner of Patents.

ELECTRON. (100-20 M.)

Claims one and two of the amendment
filed Sept. 13th are held to be substantially met by
English patent of Tonn - 3809 of 1872 before cited.
These claims are therefore rejected.

Any communication respecting this application should give the serial number, date of filing, and title of invention.

Thomas A. Edison.

Electric Light and Systems of Electric Lighting.

Filed February 26th, 1877.

Commissioner of Patents,

Sir:-

In the above case I submit the following

amendment:

Revoke claim 1 and 2 and adjust the numerals of
the remaining *claims*.

Respectfully,

Very for Edison.

New York, November 2nd, 1880.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(U-S-P)

DEPARTMENT OF THE INTERIOR,

MAILED.

UNITED STATES PATENT OFFICE

U. S. 8 886

WASHINGTON, D. C.

November 8 1880

T. A. Edison,

Care R. N. Dyer,

N. Y. City.

Subject: Electric Lights and Sys.

of Electric Lighting.

Filed Feb. 5, 1880. No. 165-23.

Please find below a communication from the Examiner in charge of the application
above noted.

W. W. Montgomery

Commissioner of Patents.

Room No. 91

Under the provisions of paragraph 45 Rules of Practice, it will be necessary for applicant to embody in the specification and oath, the date and number of the English patent NO. 578 of 1880, taken out by him for this same invention.

Present claims 1 and 2 are upon reconsideration thought to be lacking in any substantial novelty by reason of the English patent 3809 of 1872 of record, and patent 233, 445 to J. W. Swan Oct, 19, 1880, (filed Sept. 1880) Figs 7 and 8 of this reference are clearly an anticipation of claim 2.

The 1st claim differs from the second merely in arrangement of the carbon in a circle, this has been done before, see patent 205,

144 Sawyer and Van June 18, 1878. In view of the references cited

no invention is involved in this arrangement. The application must be

rejected.
of Electric Lighting.
Care M. N. Dyer,
M. Y. City.

Pop. S. 1880.
108-32

15
Nov 6 1886

Under the provisions of paragraph 45 Rules of Practice, it
will be necessary for applicant to specify in the specification and
claim the date and number of the English patent No. 278 of 1880,
taken out by him for this same invention.

Present claims 1 and 2 are upon reconsideration thought to
be lacking in any substantial novelty by reason of the English patent
2803 of 1878 of record, and patent 322, 445 to J. W. Swan Oct. 19,
1880, files 7 and 8 of this reference are clearly an anticipation of

claim 3.
The claim differs from the second merely in arrangement
of the carbon in a circle, this has been done before, see patent 302,

THOMAS A. EDISON.

ELECTRIC LIGHTS AND SYSTEM OF LIGHTING. ----

FILED FEBRUARY 5, 1880.

SERIAL No. 2180. (EDISON'S NO. 202.)

To the Hon. Commissioner of Patents:

Sir:-

In the above-entitled application,
I beg to submit the following amendment;

Erase the entire Specification and claims down
to the signing clause on last page, and insert instead
thereof, the following:

To all whom it may concern, Be it known,
that I, Thomas A. Edison, a citizen of the United States,
residing at Menlo Park, in the County of Middlesex and
State of New Jersey, have invented a certain new and useful
Improvement in Electric Lights and in Systems of Electric
Lighting, of which the following is a specification:

As has been made known by my Patent, No. 225,398,
and by various publications, my incandescent electric
lamp is one of high resistance, composed of a filament of
carbon, enclosed in a vacuum chamber made entirely of
glass. (i.e., having all joints closed by the fusion of the
glass) and provided with platinum leading-in wires passing
through the wall of the glass chamber and sealed therein
by fusion of the glass around and upon the wires, and it
has also been made known that in my system of electric
lighting I arrange these high resistance lamps in multiple

are, and that this enables me to make a practical division of the electric light.

Practical and
The invention herein relates to a lamp and system of this character.

If a conductor having a definite area of radiating surface and a definite resistance be raised to a definite temperature, a definite amount of light is the result, a definite current of electricity or a definite electro-motive force being required therefor, and conductors or mains being proportioned to all these conditions.

I have found that if the resistance of the transmitting medium be increased, its radiating surface remaining the same, the same definite amount of light will be produced, and the conductors may be diminished in size in proportion to the increased resistance; an increase of electro-motive force being required, proportionately, much less, however, than the increase of resistance; For example, using figures for illustration only; assume that all the lamps in circuit have incandescing conductors of 100 ohms resistance, that 1,000 pounds of copper in conductors are required in the circuit and that 100 volts of electricity is the electro-motive force necessary to raise the lamps to normal incandescence. If now, without changing the radiating surface of the incandescing conductors we raise their resistance to 200 ohms each, a pressure of 140 volts will be required to give the same luminous effect, but the conductors may be reduced one-half, 500 pounds only being required; that is, while the resistance

is doubled, the radiating surface remaining the same, an increased electro-motive force of say only 40 % is needed, while but one-half the original outlay for main conductors is necessary.

Case
As a sequence to the above, if the radiating surface and the resistance is increased in the same ratio, that is doubled, giving double the light at normal incandescence, the mass of conductors thereto from ^{the} source of energy need not be increased, although the electro-motive force must be increased about 40 %.

These facts I have utilized in this invention, so adjusting the relations existing between radiating surfaces, their resistance and the conductors from the source of energy, that economy in first cost and in the cost of maintenance may be subserved;

And to this end, that systems of electric light^{ing} may be economically used even in sparsely settled localities, or where the number of consumers is few, in comparison to the area, and further, that means may be provided for lighting at small cost highways and streets where there are few if any consumers and where it is desired to lay conductors simply or mainly for the necessary street lights

2
And the invention consists, in the novel form or construction of the lamp, and in the system of arrangement of such lamps in circuit, whereby, a current of higher tension can be used than has heretofore been possible in multiple-arc arrangements and proportionate saving can be

made in the cost of conductors.

In the accompanying drawing forming a part
hereof ---

Fig.1 is a perspective view of the lamp;

Fig.2 a plan view illustrating the connections;

Fig.3 an elevation of one of the carbon filaments; and

Fig.4 a view showing the connection of the lamps with
a circuit.

A is the glass enclosing globe of the lamp; and

C, the glass support for the carbon filament.

As will be understood the carbon filaments
are mounted upon the glass support C, the leading-in wires,
1, 2 passing through such glass support and being sealed
therein by the fusion of the glass, and this support, with
the carbon filaments thereon, is introduced into the open
end of the bulb or globe A, which is then sealed to the
glass support C by fusion of the glass. The globe A is
then connected with an apparatus for producing a vacuum,
and after a high vacuum has been produced in the globe,
the globe is sealed by the fusion of ^{the} glass so as to main-
tain the vacuum, the lamp chamber thus being made entirely
of glass and being sealed at all joints by the fusion of
the glass.

The lamp of my present invention employs two or
more carbon filaments, B. Five of such filaments are shown
for illustration. These filaments are connected in series
by having their adjoining ends connected by clamps X, D
except the ends of the first and last filaments of the

series, which are connected with separate clamps ^B_A from which the leading in wires, 1 & 2, pass through the glass support C and out of the lamp. To support the carbon filaments the clamps D are connected with the glass support C by wires d, which are stuck to the glass by softening it, so that while all the filaments are firmly supported upon the glass support C there are only two connections, namely, 1 and 2, passing to the exterior of the lamp.

The current entering the lamp by the wire 1 — passes through the carbon filaments in succession, and out of the lamp by the wire 2; hence an electro-motive force sufficiently high to overcome the resistance of all the filaments and to bring them up to the normal incandescence will be required.

By making the carbon filaments of proportionately smaller cross-section and radiating surface, the two or more filaments of the lamp may have only the same radiating surface as a lamp with a single filament, in which case, although the lamp will give only the same light as a lamp with a single carbon filament, yet it will have a greater resistance per unit of radiating surface and a current of proportionately smaller quantity, but greater tension will be required to produce normal incandescence, and hence, for the same luminous effects in candle power, the conductors leading to the lamp may be much smaller.

Exam (~~If on the other hand, each of the filaments B has the standard radiating surface and resistance, that is, has the same radiating surface and resistance of a lamp~~

6 Having a single filament, then the electro-motive force must be increased in order to produce the same current in the lamp and a proportionately greater light will be produced than with a lamp having a single carbon filament, although the conductors leading from the source of energy need not be increased in size.

These conditions, of course, are only obtained when the lamps are connected with the ^{supply} circuit 3, 4, by separate multiple arc or cross-circuits as shown in figure 4.

This ability to diminish the amount of metal in conductors is a great improvement, as in many instances, notably in thinly settled localities. It may determine the practicability of a system of electric lighting. It also enables localities far distant from the central station or source of electric energy to be supplied with electrical energy for the purpose of light and power where under ordinary conditions, or under any conditions which have, so far as I know been proposed, the first cost of conductors and the cost of maintenance would prove insurmountable obstacles.

With reference to the details of construction of my lamp, the placing of the two or more carbon filaments connected in series, in a lamp-chamber made entirely of glass and having a vacuum therein, a durable and practical lamp, and one having the highest economy in use is produced; further, by mounting the carbon filaments entirely upon the glass support of the lamp, a practical construction is produced and the shadows produced by the lamp are

loosened; in fact, by inverting the lamp, no shadow at all will be cast. The carbon filaments are made in the shape of loops or arches, in order to enable them to be supported entirely from the glass support and to reduce the shadow; *and also to enable a greater length to be used in a globe of definite size*
What I claim as my invention is:---

See paper 27
FIRST. An incandescing electric lamp, having in combination, a vacuum chamber made entirely of glass, two or more carbon filaments connected in series within such chamber, and leading-in wires connected to the ends of such series within the lamp and passing through and sealed into the walls of the lamp chamber, substantially as set forth.

SECOND. An incandescing electric lamp, having in combination, a vacuum chamber made entirely of glass and consisting of a glass support and an enclosing globe, two or more carbon filaments connected in series within such chamber and supported entirely from such glass support and leading-in wires connected with the ends of such series and passing through and sealed into the walls of the chamber, substantially as set forth.

THIRD. An incandescing electric lamp, having in combination, a vacuum chamber entirely of glass, two or more arch or loop-shaped carbon filaments connected in series in such chamber, and leading-in wires connected to the ends of such series and passing through and sealed into the walls of the chamber, substantially as set forth;:

FOURTH. An incandescing electric lamp, having in combination a vacuum chamber made entirely of glass and composed of a glass support and a glass enclosing globe; two or more carbon filaments of arch or loop-shape connected in series in such chamber and supported entirely from said glass support, and leading-in wires connected with the ends of such series and passing through and sealed into the walls of the chamber, substantially as set forth.

FIFTH. In an incandescing electric lamp, the combination with the exhausted glass chamber composed of a glass support and enclosing globe, of two or more carbon filaments connected together in series within such chamber, leading-in wires connected with the ends of such series and passing through and sealed into the walls of the chamber, and supports from the intermediate connections between the filaments to the glass support, substantially as set forth.

SIXTH. In a system of electric lighting, the combination with a circuit, of two or more lamps connected in multiple and therewith, each of said lamps having two or more carbon filaments connected in series within the enclosing globe, substantially as set forth.

An additional sheet of drawing is filed herewith.

Respectfully

Richd. A. Nyer

Atty for Edison

New York Feb'y 2/88.

*insert
to 6 - paper
27*

STATE OF NEW JERSEY, :
: SS:
COUNTY OF ESS EX. :

THOMAS A. EDISON, being duly sworn, deposes and says, that he verily believes himself to be the original and first inventor of the ^{improvement} lamp as described and claimed in the foregoing amendment, in addition to that which was embraced in the claims originally made, and that he does not know and does not believe that the same was ever known or used before his invention thereof, and that the matter sought to be inserted formed a part of his original invention at the date of filing said application, and was invented by him before he filed the same.

And deponent further states, that he is informed and believes that his said improvement has not been patented, to him or to others, with his knowledge or consent, except in the following countries:-

Italy,	No. 11787,	April, 28,	1880.
Canada,	" 11820,	July 19,	1880
Austria,	T 30 f 1418,	August 13,	1880
Sweden,		June 25,	1880
Norway,		September 24,	1880
Russia,		December 14,	1881
Germany,	" 15002	December 31,	1881
Spain,	" 920	January 2,	1882
Portugal,	" 621,	September 22,	1880
Belgium,	" 51155,	April 30,	1880

France,	No. 136,084	June 16,	1880
Great Britain,	" 578	February 10,	1880
India,	" 415	June 23,	1880
Victoria,	" 2,842	June 15,	1880
New Zealand,	" 484	October 18,	1880
Queensland,		August 3,	1880
New South Wales,		July 26,	1880

That this statement as to the Patents granted upon said improvement is made at the request of the Commissioner of Patents, and that in view of the fact that none of said patents were granted prior to the date of his application herein, the deponent protests against the limitation of his United States Patent by such foreign patents, or any of them.

Subscribed and sworn to
before me this 2nd day of
February, 1888.

Thos. A. Elson

Lick W. Dyer
Notary Public
State of New Jersey



All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(3-686.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE

WASHINGTON, D. C.

U. S. PATENT OFFICE
MAILED
FEB 17 1888

T. A. Edison,

Care, R. H. Dyer,

40 Wall St.,

N. Y. City.

Application for patent for

Lighting System.

Filed Feb. 5, 1888

Please find below a communication from the Examiner in charge of the application
above noted.

Mr. H. J. Hall
Benton
Commissioner of Patents.

Room No. 91.

(533-33) 113

On page 6, lines 7 to 10, inclusive, applicant after describing the results to be attained by his improvement, says "These conditions, of course, are only obtainable when the lamps are connected with the supply circuit 3, 4, by separate multiple arc or cross-circuits as shown in Fig. 4". This amounts practically to an acknowledgment that the case as originally presented was improbable and inoperative, for no such arrangement was ever hinted at in either the original or the substitute specification, of July 27, '82.

This statement and all other suggestions in the present substitute specification that the lamps must be arranged in

(over)

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
WASHINGTON, D. C.

multiple are must be regarded as new matter, as well as the new sheet of drawing. The examiner is of the opinion that the new matter above referred, is not of such a character that it may be introduced by a supplemental oath, as it involves a departure from the original invention.

Until the above objection is disposed of, any further action on the merits will be deferred. Attention is called to Ex parte Randall, 35 O. G. 625; Ex parte Vaile, 37 O. G. 583.

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Thomas A. Edison

Electric Lights and Systems of Electric Lighting

Dated February 5, 1890

Serial No. 2100 (Edison's No. 202).

To the Commissioner of Patents:

Sir:--

In the above entitled case the following is respectfully submitted in reply to the Examiner's letter of the 16th inst.:

The words quoted by the Examiner and taken from the amended specification dated the 2nd inst were intended to express the fact that the conditions assumed in the description preceding them indicated to persons skilled in the art definitely and beyond doubt that the lamps were intended to be arranged in multiple-arc, and not as an acknowledgment that the case as originally presented was incomplete. The additional matter was inserted as a brief description of the additional drawing, which was put in the case in accordance with the practice of the Patent Office requiring an illustration of everything that is claimed when an illustration is possible. The multiple-arc arrangement could have been claimed without this illustration and without the additional matter in the specification.

It had been made known to the scientific world by numerous publications in December, 1879, and January, 1880, that Mr.

Edison claimed to have accomplished the sub-division of the electric light by the use of carbon filament lamps of high resistance arranged in multiple-arc; such a lamp was described in his patent No. 223,898 issued January 20, 1880. His specification in this case was drawn at the time when the discovery of Mr. Edison how to divide the electric light was a matter of general comment. It was ^{so} obvious to the draughtsman ^{of} the specification that the multiple-arc arrangement was intended that he failed to say so in direct terms; he, however, throughout the specification assumed conditions of use which to a person skilled in the art could mean nothing except a multiple-arc arrangement. Take for illustration, the figures given on the second page of the original specification. It was known at the date of that specification that Mr. Edison's lamp was preferably about a hundred ohms in resistance and required an electro-motive force of a hundred volts to bring it to normal incandescence. Now with lamps each of a hundred ohms resistance the incandescence could not be produced or maintained with one hundred volts electro-motive force unless the lamps were arranged in multiple-arc, because two of such lamps in series would require at least one hundred and forty volts and a larger number in series a proportionately higher electro-motive force. Again, it is stated that by raising the resistance of each lamp to two hundred ohms a pressure of one hundred and forty volts will be required to give the same luminous effects. It is well known that two or more lamps each of this resistance

cannot be raised to incandescence by one hundred and forty volts and hence the statement can refer only to a multiple-arc arrangement of the lamps. Again, the question of the cost of conductors with which the specification deals is a question that experts then knew and now know relates only to a multiple-arc arrangement of the lamps. A series arrangement requires the use of a lamp of relatively low resistance, the saving in conductors being obtained by the series arrangement of the lamps, while with the multiple-arc arrangement the problem was and is to obtain a single lamp of sufficiently high resistance to enable the use of a current of relatively high tension.

Now that the Examiner's attention has been called particularly to the matter it is thought there can be no difference of opinion between him and the attorney as to the meaning of the original specification. However, should the Examiner consider it desirable the attorney will submit the affidavits of one or more eminent experts on the questions.

Attorney for Edison.

New York, February 27, 1888.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(2-498.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE

WASHINGTON, D. C.,



T. A. Edison,

Care, R. N. Dyer,

40 Wall St.,

N. Y. City.

Application for patent for

Electric Sts & Systems of

Electric Light.

Filed Feb. 5, 1888

Please find below a communication from the Examiner in charge of the application above noted.

M. V. Montgomery
Benton J. Hall
Commissioner of Patents.

Room No. 91.

(4321-83 31.)

The office is not inclined to admit that the original specification either distinctly or inferentially gives the idea that the system was to be arranged in multiple arc., It is granted that in certain exceptional cases a specification may be amended so as to embrace features not originally specified, yet it is well settled that such amendments must be merely of an explanatory nature, and cannot be used as the basis for new claims: See ex parte Buell, C. D. 1884, page 4. In this case applicant seeks to make an amendment from the basis of the present 8th claim.

over

Feb 28

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[illegible]

Thomas A. Edison,
Electric Lights and Systems of Electric Lighting,
Filed February 5, 1880,
Serial No. 2139, (Edison's No. 202) .

To the Commissioner of Patents.

Sir:---

In the above entitled case an affidavit of Frank
George W. Barker is filed herewith showing that the original
specification describes a multiple-arc arrangement of the lamp.
There can be no doubt as to this, hence the latter objected to
is not 'new matter' and the case does not come within the re-
vision in respects well referred to by the Examiner. His
attorney contends that the Sixth claim might have been prop-
erly made without the additional drawing or the brief reference
to it added to the specification by amendment. It is hoped
that the Examiner will now withdraw his objection in order to
prevent the delay incident to an appeal.

Respectfully,

Rich^d N. Dyer
Att'y for Edison

New York Mar. 8. 88.

IN THE UNITED STATES PATENT OFFICE.

-----:
In re application of Thomas A. Edison :
for Improvement in Electric Lights :
and Systems of Electric Lighting, :
filed February 5, 1930, Serial No. :
2180, Edison's No. 202. :
-----:

STATE OF *Penn a*
County of *Phil a* ss.

George ~~B~~. Barker being duly sworn deposes and says; I
am 51 years of age, reside in Philadelphia, and am Professor
of Physics in the University of Pennsylvania. I have been
professor on the subject of physics and chemistry for twenty-
five years, and as such have paid particular attention to the
subject of electricity for the purpose of teaching the sub-
ject to my classes as well as for the purposes of my own in-
vestigations. I have spent several years in the construction
of electrical apparatus and have always had an extended col-
lection of such apparatus at my disposal for the purposes of
experiments. I acted as one of the United States Commissioners
to the International Electrical Exhibition of Paris in 1881,
was one of the Delegates representing the United States in
the International Congress of Electricians, and was vice-pres-
ident of the Jury. I received from the French Government at
that time the decoration of Commander of the Legion of Hon-
or. I am a member of the National Academy of Science, and
have been president of the American Association for the Ad-

vancement of Science. I have been frequently called upon to testify as an expert in patent causes, particularly those having reference to the subject of electric lighting. And I have kept myself fully informed of the progress of the art of electric lighting.

I have carefully read the original specification filed February 5, 1880, as a part of the above application for patent, such specification having been signed by the said Edison on the 23th day of January, 1880, and I understand the invention described therein. That invention is entitled an Improvement in Electric Lights and in Systems of Electric Lighting. The electric light described is one having two or more carbon filaments located within the enclosing globe and connected in series with the wires which pass through the glass of the globe for connection with the circuit. The system described in said specification is one wherein a large saving in conductors will be made by the use of these high resistance lamps. I have carefully read and considered the specification with reference to the particular system or arrangement of lamps that is described in it, and I am clearly of the opinion that the specification describes a multiple-arc arrangement of the lamps, since the conditions assumed in the description are consistent only with such an arrangement of the lamps. I have no hesitation in expressing it as my opinion that persons skilled in the art would understand the description as meaning a multiple-arc arrangement of the lamps and as excluding a series arrangement of the lamps.

Cal

George F. Barker

Sworn to and subscribed before me
this 4 day of March, 1880

Wm B. Wier, Notary Public

All communications should be addressed to
The Commissioner of Patents,
Washington, D. C.

(2-108.)

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE

U. S. PATENT OFFICE

MAILED

WASHINGTON, D. C., Mar. 27, 1888

MAR 29 1888

T. A. Edison,

Care, R. A. Dyer,

40 Wall St.,

New York, N. Y.

Application for patent for

Systems of Electric Lighting

Filed

Feb. 5, 1888

Please find below a communication from the Examiner in charge of the application above noted.

Mr. Montgomery
Baxter J. Dyer
Commissioner of Patents.

Room No. 91

(1000-21 35.)

This case has been carefully reconsidered in connection with the affidavit of Prof. Baker and the argument of the attorney and no reason is seen for changing the official action last made. The invention disclosed in the specification and the drawing, as they were originally presented, related to a single lamp, and not to a system, of lamps either in series, or in multiple arc. Whether or not applicant intended to use this invention of a single lamp of a specific character in a series system or in a multiple arc system has nothing to do with the question now at issue. The invention disclosed in the application being in the construction and arrangement of a single lamp, so that with a given radiating over

surface and a given electro-motive force, together with a higher specific resistance in the lamp, a less weight of metal could be employed in the conductors for this particular individual lamp. This being the case, applicant is not at liberty to now claim a particular system as a part of his invention.

If the benefits which he claims, flow from the particular construction of the single lamp which he describes, then he will be protected in the use of such lamp in any situation, and he is not thereby enabled to claim his lamp when arranged in this peculiar situation, or, in other words, when arranged in a system of a particular character.

It is now observed that there is additional new matter, which was overlooked in the last action. On page 5 of the amendment of Feb. 9, it is stated that the carbon filaments are of proportionately small cross section, and the description proceeds to state that the benefits desired will flow from this specific arrangement; while in the original specification it was generically stated that the filaments to attain the object, should have the same radiating surface, with a greater specific resistance, and this statement might be said to broadly include the specific manner of accomplishing this end, which is now pointed out; to wit: a lesser cross section; yet, that specific form was not disclosed in the original case, but another particular way of attaining the same end was given. Through appli-

cant's generic claim may include both these specific methods, yet it is not permissible for him to claim specifically the particular method of accomplishing his result, which was not disclosed in his original case, but he must limit himself to a generic statement, and to such statements as are found in the case as originally filed. For these reasons, the paragraph referred to on page 5 of the amendment specification must also be objected to as new matter.

Room No. 91.

Application of Thomas A. Edison,
Systems of Electric Lighting,
Filed February 26th, 1880,
Serial No. 2100, (Minor No. 203)

To the Commissioner of Patents,

Sir:

The Attorney has decided to adopt the suggestion contained in the Examiner's letter dated February 27th 1881, viz: to introduce the matter relating to the multiple arc arrangement of the lamps merely by way of explanation.

With that end in view the Examiner is requested to erase the 6th claim.

With regard to the alleged new matter found by the Examiner on page 5 of the amended specification, it is respectfully submitted that this matter is warranted by the description on the 2nd page of the original specification commencing with the words "if now without changing the radiating surface"

The original specification refers to both ways of carrying out the invention. The amended specification merely repeats the statement as to the second way in the second portion of the description which the original specification failed to do. Some draughtsmen of patent specifications do not do this, considering the statement once made as sufficient. That was the practice of the draughtsman of the original specification. But the present Attorney thinks it a better

form to state all the ways of carrying out the invention in both portions of the description. The original specification having had the matter in one portion of the description the Attorney thought he was entitled to put it into both portions of the description. The question is not one of substance but merely of form and arrangement of the descriptive matter.

Respectfully,

Att'y for Edison.

New York, June 18th, 1888.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(2-988.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE
MAILED
JUN 25 1888

WASHINGTON, D. C., June 25, 1888.

Thomas A. Edison,

Care, R. N. Dyer,

No. 40 Wall st.,

New York, N. Y. Filed Feb. 5, 1880 No. 2,180

Application for patent for

Incandescent Lamp.

Please find below a communication from the Examiner in charge of the application
above noted.

A. A. Montgomery
Clinton J. Hall Commissioner of Patents.

Room No. 91

(5555-29 31.)

That portion of the original specification relied upon to
justify the invention of the matter heretofore objected to as new
in the substitute specification does not relate to the filaments,
but to the mains of the system.

The objection made is insisted upon, and the next action
should be either to erase the objectionable matter, or take an
appeal from this action.

APPLICATION OF THOMAS A. EDISON
ELECTRIC LIGHTS AND SYSTEMS OF ELECTRIC LIGHTING
FILED FEBRUARY 5, 1880
SERIAL No. 2,180.

TO THE COMMISSIONER OF PATENTS-

The petition of Thomas A. Edison, the applicant above named, respectfully represents:

1. That on or about February 3, 1888 there was filed in this application a substitute specification in which among other things it was stated that the lamps shown and described in the application were arranged in multiple arc circuits and at the same time a new sheet of drawings was filed showing such an arrangement of the lamps. In one of the claims forming part of said substitute specification, viz. the 6th claim, the said lamps were referred to as being in multiple arc. Said substitute specification and drawing were accompanied by a supplemental oath under Rule 48.

2. In a letter dated February 16, 1888 the Examiner objected to the statement of the specification in regard to the multiple arc arrangement of the lamps and refused to act any further on the merits of the application, on the ground that such statements and ~~a~~ new sheet of drawings must be regarded as new matter.

3. That on or about February 21, 1888 an argument was filed to show that the statement about the multiple arc arrangement was not new matter but that such matter was sufficiently included in the original specification.

4. That in a letter dated February 27, 1888 the Examiner repeated his objection to the alleged new matter stating that while the amendment might be admissible as matter of explanation it could not be admitted as the foundation for a claim such as the aforesaid 6th claim of the substitute specification.

5. That on or about March 9-1888 the affidavit of the expert was filed in further proof of the fact that the original specification contained sufficient basis for the amendment.

6. That in a letter dated March 27-1888 the Examiner repeated the previous objection and objected also to a further statement in the substitute specification on the same ground that such statement was new matter.

7. That on or about June 13, 1888 applicant filed an amendment erasing the said 6th claim and asking for a reconsideration of the new objection raised in the official letter immediately preceding.

8. That in a letter dated June 25, 1888 the Examiner insisted upon his objection to "the matter heretofore objected to as new in the substitute specification" and stated that "the next action should be either to erase the objectionable matter or take an appeal on this action."

WHEREFORE your petitioner requests that the Examiner in charge of said application be advised that the erasure of the said matter objected to by him should not be insisted upon and directed to proceed to examine the application on its merits.

-3-

An oral hearing upon this petition is requested at
such time as the Commissioner of Patents may appoint.

Respectfully,

Thomas A. Edison,

by,

Attorney.

New York, March 6, 1890.

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT-OFFICE.

Washington, D.C. March 12, 1880.

In Re Application of THOMAS]
A. EDISON, for INCANDESCENT]
LAMP, filed Feb. 5, 1880.]
Serial No. 2180.]

Before the Commissioner of Patents
on Petition.

EXAMINER'S STATEMENT.

This application comes before me personally for the first time on this Petition which is taken from the Examiner's objection as to new matter said to be introduced into the Specification.

The introduction of new matter is a question of merits and not of form as will appear from Rule 133, and your decision in Ex Parte Barney Vol. 41, page 149, and the Petition should therefore be dismissed. When it comes back to me, I can re-examine it and either reject the application for containing new matter which will entitle applicant to an appeal to the Board, or waive the objection if I am convinced that there is no new matter in the case.

Respectfully submitted.

GUSTAVE HISSING.

EXAMINER, DIVISION XVI.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D.C. March 15, 1890.

In the matter of the

application of

Thomas A. Edison

Petition.

Electric Lights and

Systems of Electric Lighting

Serial No. 2180.

Sir;

You are hereby informed that a hearing on the above
petition from the action of the Primary Examiner has been fixed
for Tuesday April 15th, 1890 at 12.30 P.M.

By direction of the Commissioner,

Very respectfully,

Melvin L. Lusk

Acting Chief Clerk.

Thomas A. Edison,
Care Richd. N. Dyer,
40 Wall St.,
New York, N.Y.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D.C. April 16, 1890.

In the matter of the
application of

Thomas A. Edison

Petition.

Electric Lights and
System of Electric Lighting
Serial No. 2,180.

Sir;

You are hereby informed that the above entitled case has
been remanded to the Examiner for action in accordance with the
decision of the Commissioner of the 15th instant rendered in
ex parte Edison Serial Number 76,352 which decision is decisive of
the questions herein involved.

By direction of the Commissioner,

Very respectfully,

Samuel Surry

Chief Clerk.

Thos. A. Edison,
Care R. N. Dyer,
40 Wall St.,
New York, N. Y.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.



Thomas A. Edison

Care Richard N. Dyer

#65 Fifth Avenue

New York City

Subject:

Electric Light

#2180

Filed

Feb. 5, 1880 No.

Please find below a communication from the EXAMINER in charge of the application above noted.

Room No. 91

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

Commissioner of Patents.

The application has been returned to the Examiner for consideration in connection with the Commissioner's Decision of April 15, 1890.

In view of the fact that applicant makes no claim to the multiple arc arrangement and to the matter in the third paragraph of page 5, the objection as to new matter will not be insisted upon. Should, however, a claim including these features be presented, it will have to be rejected as containing new matter, for by embracing these features in a claim, applicant makes them material departures from the original invention.

In order to bring the specification and claims into accord, all statements that the invention herein relates to a system should be canceled; see page 2, line 3, and page 3, line 25.

Any communication respecting this application should give the serial number, date of filing, and title of invention.

On page 3, line 16, "to this end" should be canceled and the paragraph containing these words be made a part of the preceding paragraph, in order to make sense. On page 6, line 7, "only" should be canceled as superfluous and misleading.

In order to clear ideas, it may be said that the applicant has not discovered any new law as shown by the publications cited in the Office letter of Sept. 20, 1880, and that he does not pretend to be the discoverer of any new law but simply asks for a patent for the practical utilization of an old law as seen in his argument, Dec. 10, 1880. In fact, in the judgment of the Examiner, so far as the general principles go, applicant has herein set forth nothing over his former broad patent, No. 223898, Jan. 27, 1880, but has merely illustrated the ^{theoretical} principles which a commercially practical lamp must embody, which he fully disclosed in that patent by giving ^{at} mathematical examples, which, it so happens, any one versed in the theory of electricity could have given by the use of Joules' law. The main idea in this application as in the patent is to increase the ratio of the resistance divided by the radiating surface. The means applicant adopts is to use two filaments instead of one long filament and a long filament was contemplated in the

patent. But it is a well settled principle of law that there can be no invention in making in two pieces what has been made in one and this is all that distinguishes the first four claims herein over the former patent. The first four claims are therefore rejected for this reason alone.

Again, it was old to have separate filaments in series enclosed in a lamp bulb instead of a single filament, as appears from Konn, A. D. 1872, No. 3809, so that the particular means for obtaining a great length of filament which applicant adopts, i. e., two separate filaments in series, was known before the date of applicant's patent and applicant could therefore use this means of obtaining great length without exercising invention.

Again, the first four claims are rejected on the lamp shown in Engineering for 1878, page 293, figure 1, taken together with Konn, and Staite, (English), A. D. 1848, No. 12212, figure 25 A, which shows the arc shaped filament, applicant having a mere substitution of Konn's carbon conductors in series for Crookes' platinum conductor, using Staite's arc shape. Applicant may attempt to avoid this ground of rejection by specifying in each claim, the elements of novelty on which he relies to sustain his former patent. But, obviously, the claims when so amended will

rest for their patentability upon the very features which he has already covered in his former patent, the rest being old and by allowing the claims, two patents would be granted for the same thing. It is not therefore essential to consider whether applicant has anything patentable over Korn, Staite, and Crookes, for whatever features there may be in his former patent or in this application not found in Korn, Straite, and Crookes, those features have been covered by the patent and cannot be again covered in a separate patent.

THOMAS A. EDISON

ELECTRIC LIGHTS AND SYSTEM OF ELECTRIC LIGHTING

FILED FEBRUARY 5, 1880

SERIAL NO. 2180

EDISON'S NO. 202

TO THE COMMISSIONER OF PATENTS,

S I R :-

In the above entitled case I beg to submit the following: On the 3rd page of the amended specification erase the paragraph beginning with line 5 and ending with line 10. Also erase the paragraph beginning with the 3rd line from the bottom of page 5 and ending with the 6th line from the top of page 6. Also in 5th line from the top of page 7 erase the period after the word "shadow" and insert ----- ; and also to enable a greater length to be used in a globe of *different* size. *Wm*

By using a number of carbon filaments, to secure the increased resistance without a corresponding increase in radiating surface, I avoid the many difficulties which arise from attempting to accomplish this purpose with one continuous carbon filament. — — —

Add the following claim: ----- 6. In a system of generation, distribution and translation of electricity for purposes of light, the method of diminishing the amount of metal required in a given length of main conductors and producing a definite candle-power of light, consisting in increasing the ratio of resistance to radiating surface in the lamps by providing each lamp with a burner composed of two or

more carbon filaments connected in series, each filament being reduced in cross-sectional area so that the combined surface of the two or more filaments will be of such an extent as to give the standard amount of light for the entire burner, while the resistance of the burner will be due to the combined resistance of the two or more filaments, substantially as described. -----

In view of the additional claim now inserted, the statements in the specification with regard to the invention relating in part to a system are thought to be pertinent.

With respect to the references, the patent of Kenn shows two carbon rod burners in series in the lamp chamber, but it is evident that Kenn had no idea of the principle of a high ratio of resistance to radiating surface, and that his lamps were not intended for use in multiple arc, in which arrangement the high resistance becomes useful. Indeed, as clearly shown by his specification and by the use of a short-circuiting cut-out on his lamps, he intended to employ his lamps in a series arrangement. In addition, it is thought that the reference now made in the specification to the difficulties arising in attempting to secure the object by the use of one continuous and exceedingly fine filament, forms a proper basis for the claims upon the construction of the lamp.

Respectfully,

Attorney for Edison.

New York, April 7, 1892.

RECEIVED
APR 21 1892
MYER & SEELY

(S-071 n.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., April 19, 1892.

U.S. PATENT OFFICE
RECEIVED
APR 21 1892
ELECTRICAL DIVISION

Thomas A. Edison,

Care Myer & Seely,
35 Wall Street,

New York City.

Subject:

Incandescent Lamp and
Lighting System.

Filed Feb. 5, 1880. No. 2180.

Please find below a communication from the EXAMINER in charge of the application
above noted.

Room No. 91.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

W. E. Simonds

Commissioner of Patents.

The correction on page 3 line 16, called for in the last
Office letter should be attended to in order that the two paragraphs
shall make proper sense.

The other corrections of the specification called for
have been waived in view of the additional claim at the suggestion
of applicant. This should be done at once in order that abandon-
ment may not attach. This additional claim is rejected for reas-
ons and on references fully and explicitly stated in the previous
action.

It is true that two actions have not been had, but the
above action must be considered as a final rejection after the cor-
rection of the formal matter, for no applicant, especially one whose
case has been pending in the Office for twelve years has any right

7000 b-100 m

only page received

Any communication respecting this application should give the serial number, date of filing, and title of same.

to delay appeal indefinitely by presenting new claims. The formal requirements should be met within thirty days when final rejection will be had.

APPLICATION OF THOMAS A. EDISON

ELECTRIC LIGHTS AND SYSTEMS OF ELECTRIC LIGHTING

SERIAL NO. 2180

FILED FEBRUARY 5, 1890

TO THE COMMISSIONER OF PATENTS,

S I R :-

On 3rd page of specification substitute a semicolon for the period occurring after the word "subserved" in 15th line, and substitute a small letter for the capital at the beginning of the 16th line, same page.

This seems to be the only correction called for by the Office letter of April 19th, although that letter in its second paragraph reads as if something had been omitted.

Respectfully,

Attorney for Edison.

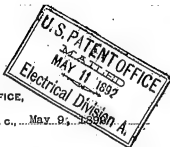
New York, May 5, 1892.



(2-571a)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., May 9, 1892



Thomas A. Edison

Care Dyer & Seely

36 Wall St.

New York, N. Y.

Subject:

Filed Feb. 5, 1880, No. 2180

Please find below a communication from the EXAMINER in charge of the application above noted.

Room No. 91

If communications should be addressed to:
"The Commissioner of Patents,
Washington, D. C."

W. E. Simonds

Commissioner of Patents.

The formal corrections referred to in the last official letter having been made, the claims are now finally rejected for reasons already stated. Primary examination is closed and the next action must be in the nature of an appeal to the Board of Examiners-in-Chief.

Any communication respecting this application should give the serial number, date of filing, and title of invention.

APPLICATION OF THOMAS A. EDISON

ELECTRIC LIGHTS AND SYSTEMS OF ELECTRIC LIGHTING

FILED FEBRUARY 5, 1890

SERIAL NO. 2,180

TO THE COMMISSIONER OF PATENTS,

S I R :-

In the above named application, I hereby appeal to the Board of Examiners-in-Chief from the decision of the Primary Examiner finally rejecting the claims.

As reasons of appeal we submit the Examiner erred,

1. In rejecting claim 6 on the ground that it contains new matter.
2. In deciding that applicant has set forth nothing over his patent No. 223,898.
3. In rejecting the first four claims on his patent No. 223,898 and on the lamp shown in Engineering for 1878, page 293, figure 1, taken together with British patents to Korn No. 3809 of 1812 and Staite No. 12,212 of 1848.

The appeal fee of \$10 is forwarded herewith.

An oral hearing is requested.

Respectfully,

Attorney for Edison.

New York, May 8, 1894.

[2-044.]

Room No.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,

U. S. Patent Office,

Washington, D. C. May 9 1894

SIR:

I have to acknowledge the receipt of the APPEAL to the

Exe in Chief

in your application for Improvement in

*Electric Light and System
of Electric Lighting*

with *10* as

the fee payable thereon.

Of the result due advice will be given.

Very respectfully.

John S. Symson

Commissioner of Patents.

Thomas A. Edison

% Richard N. Dyer

36 Wall Street

New York, N.Y.

11723 b-1 m

UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE,
MAILED
MAY 16 1894
Electrical Division A.

Thomas A. Edison)

Electric Lights.)

Filed Feb. 5/80)

No. 2,280)

Before the Board of

Examiners in Chief.

EXAMINER'S STATEMENT.

The claims rejected are:-

1. An incandescing electric lamp, having in combination, a vacuum chamber made entirely of glass, two or more carbon filaments connected in series within such chamber, and leading-in wires connected to the ends of such series within the lamp and passing through and sealed into the walls of the lamp chamber, substantially set forth.

2. An incandescing electric lamp, having in combination, a vacuum chamber made entirely of glass and consisting of a glass support and an enclosing globe, two or more carbon filaments connected in series within such chamber and supported entirely from such glass support, and leading-in wires connected with the ends of such series and passing through and sealed into the walls of the chamber, substantially as set forth.

3. An incandescing electric lamp, having in combination, a vacuum chamber entirely of glass, two or more arc or loop-shaped carbon filaments connected in series in such chamber, and lead-in wires connected to the ends of such series and passing through and sealed into the walls of the chamber, substantially as set forth.

4. An incandescing electric lamp, having in combination a vacuum chamber made entirely of glass and composed of a glass support and a glass enclosing globe, two or more carbon filaments of arch or loop-shape connected in series in such chamber and supported entirely from said glass support, and leading-in wires connected with the ends of such series and passing through and sealed into the walls of the chamber, substantially as set forth.

6. In a system of generation, distribution and translation of electricity for purposes of light, the method of diminishing the amount of metal required in a given length of main conductors and producing a definite candle-power of light, consisting in increasing the ratio of resistance to radiating surface in the lamps by providing each lamp with a burner of two or more carbon filaments connected in series, each filament being reduced in cross-sectional area so that the combined surface of the two or more filaments will be of such an extent as to give the standard amount of light for the entire burner, while the resistance of the burner will be due

to the combined resistance of the two or more filaments, substantially as described.

The references cited are:-

No. 223,898 Jan. 27, 1880 Edison; English A. D. 1872 No. 3809 Kohn; English A. D. 1848 No. 12,212-figure 25 A-Staite; Engineering A. D. 1878 p 293, figure 1. Ganot's Physics A. D. 1883 Articles 829, 830.

The reasons for rejection are found in the letter of April 18, 1890, as follows:-

It may be said that the applicant has not discovered any new law as shown by Ganot, cited, and that he does not pretend to be the discoverer of any new law but simply asks for a patent for the practical utilization of an old law as see his argument, Dec. 10, 1880. In fact, in the judgment of the Examiner, so far as the general principles go, applicant has herein set forth nothing over his former broad patent, No. 223,898 Jan. 27, 1880, but has merely illustrated the theoretical principles which a commercially practical lamp must embody, which he fully disclosed in that patent by giving mathematical examples, which, it so happens, any one versed in the theory of electricity could have given by the use of Joules' law. The main idea in this application as in the patent is to increase the ratio of the resistance divided by the radiating surface. The means applicant adopts is to use two fila-

aments instead of one long filament and a long filament was contemplated in the patent. But it is a well settled principle of law that there can be no invention in making in two pieces what has been made in one and this is all that distinguishes the first four claims herein over the former patent. The first four claims are therefore rejected, for this reason alone.

Again, it was old to have separate filaments in series enclosed in a lamp bulb instead of a single filament, as appears from Konn, so that the particular means for obtaining a great length of filament which applicant adopts, i e., two separate filaments in series, was known before the date of applicant's patent and applicant could therefore use this means of obtaining great length without exercising invention.

Again, the first four claims are rejected on the lamp shown in Engineering taken together with Konn and Staites, who show the arc shaped filament, applicant having a mere substitution of Konn's carbon conductors in series for Crook's platinum conductors, using Staites arc shape. Applicant might attempt to avoid this ground of rejection by specifying in each claim, the elements of novelty on which he relies to sustain his former patent. But, obviously, the claims when so amended will rest for their patentability upon the very features which he has already covered in his former patent, the rest being old and by allowing the claims,

two patent would be granted for the same thing. It is not therefore essential to consider whether applicant has anything patentable over Konn, Staite, and Crookes, for whatever features there may be in his former patent or in this application not found in Konn, Staite and Crookes, those features have been covered by the patent and cannot be again covered in a separate patent.

Claim 6 is met in the same references.

(2-051.)

Room No. 242.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,



United States Patent Office,

Washington, D. C.



Thos. A. Edison
by R. M. Dyer
N.Y. City

SIR:

The appeal from the decision of the Examiner in the case of T. A.
Edison for a patent for an improvement in
Systems of Electric Lighting
filed Feb. 5, 1889, Serial No. 2180, will be heard by the
Examiners-in-Chief, Wednesday May 23/94 at 2 P.M.

If appellant, or his attorney, shall not appear at that time the hearing will
be regarded as waived, and the case will be decided upon the record.

Very respectfully,

John S. Exum

Commissioner of Patents.

IN THE UNITED STATES PATENT OFFICE.

IN THE MATTER

of the

ON APPEAL.

APPLICATION of THOMAS A. EDISON, for :
Improvement in Electric Lights and :
Systems of Electric Lighting, filed :
February 5, 1880, Serial No. 2,180. :

BEFORE

THE HONORABLE BOARD OF EXAMINERS IN CHIEF.

MEMORANDUM FOR APPLICANT.

This invention relates to a method and construction for diminishing the amount of copper required for the conductors in multiple arc systems of incandescent electric lighting. The method as stated by the sixth claim, consists "In increasing the ratio of resistance to radiating surface in the lamps by providing each lamp with a burner composed of two or more carbon filaments connected in series, each filament being reduced in cross sectional area so that the combined surface of the two or more filaments will be of such an extent as to give the standard amount of light for the entire burner, while the resistance of the burner will be due to the combined resistance of the two or more filaments."

The construction claims are five in number, and are for combinations with the character of lamp invented by Mr. Edison, namely, one having a vacuum chamber made entirely of glass, and having leading-in wires passing

through and sealed into the walls of the chamber, of (1) two or more carbon filaments connected in series within such chamber; (2) such filaments supported entirely from the glass support which forms one part of the lamp and is to be distinguished from the glass bulb which surrounds and is attached to this support; (3) such filaments when made of an arch or loop shape; (4) such filaments when made of an arch or loop shape and supported entirely upon the glass support; and (5) such filaments supported at the intermediate connections to the glass support.

The fifth claim is allowed, but the others stand rejected.

The patents upon which the Examiner relies are Edison Patent No. 223,898, which has been the subject of extensive litigation, and the Konn English Patent No. 3809 of 1872.

According to the Examiner's answer, the Edison Patent negatives both novelty and invention, while the Konn Patent is cited to illustrate the fact that two or more carbon burners have before been connected in series within the same lamp chamber.

As to the Edison Patent, it is submitted that it does not have the two or more carbon filaments, but a burner composed of a single filament of carbon, and that the special method described by that patent for accomplishing a higher ratio of resistance to radiating surface than can be accomplished by a single plain filament

is to arrange that filament in the form of a coil so that the interior and adjacent surfaces of the coil will radiate upon each other and will thus produce a restriction of the available radiating surface of the burner. Thus the special method covered by Claim 6 and the special constructions covered by Claims 1, 2, 3 and 4 are not shown or described by this Edison Patent.

As to the Patent of Konn, it is submitted that while Konn has two carbon burners connected in series in one lamp chamber, they are not filaments of carbon, nor are they employed for the purpose of increasing the ratio of resistance to surface, or for employing that or any similar principle to diminish the amount of copper necessary to operate the lamps. Konn's lamps, as his patent clearly indicates, are to be connected in series, in which arrangement the necessity for a high resistance in each individual lamp does not exist, because that high resistance is obtained by the series arrangement of a number of lamps.

It is to be further remarked that Konn does not employ the two carbon burners to secure an increased resistance while maintaining a standard radiating surface, and thus to secure the same amount of light with a greater resistance, because as clearly appears, by a comparison of Figures 1 and 2 of the Konn patent, which show respectively a lamp with one burner and a lamp with two burners, the burners in Figure 2 ^{being} each of the same size as the burner in Figure 1. Konn's only object evidently was to secure a larger lamp giving a larger

is to arrange that filament in the form of a coil so that the interior and adjacent surfaces of the coil will radiate upon each other and will thus produce a restriction of the available radiating surface of the burner. Thus the special method covered by Claim 6 and the special constructions covered by Claims 1, 2, 3 and 4 are not shown or described by this Edison Patent.

As to the Patent of Konn, it is submitted that while Konn has two carbon burners connected in series in one lamp chamber, they are not filaments of carbon,* nor are they employed for the purpose of increasing the ratio of resistance to surface, or for employing that or any similar principle to diminish the amount of copper necessary to operate the lamps. Konn's lamps, as his patent clearly indicates, are to be connected in series, in which arrangement the necessity for a high resistance in each individual lamp does not exist, because that high resistance is obtained by the series arrangement of a number of lamps.

It is to be further remarked that Konn does not employ the two carbon burners to secure an increased re-

*That such rod burners as Konn employed are scientifically and patentably different from Edison's filaments has been repeatedly asserted by the courts. See

Edison Co. v. United States Co., 47 F.R., 454;
Same v. Same, 52 F. R., 300;
Same v. Davis Electrical Works, 60 F.R., 276.

amount of light by the employment of two burners, and not to secure the same amount of light with a higher degree of resistance.

It is therefore quite evident that Konn does not anticipate the method of Claim 6, since his carbon burners are not reduced in cross-sectional area so that the combined surface of the two or more burners will be of such an extent as to give the standard amount of light for the entire burner. It is also evident that he does not anticipate the construction of Claims 1, 2, 3 and 4, because he does not have the carbon filaments of these claims, nor such filaments supported entirely from the glass support, nor filaments of an arch or loop shape. The function of these ^{last two} special features is described in Edison's specification.

The discussion must therefore be narrowed down to the question whether the method and apparatus covered by the claims of this application, although not disclosed by Edison's own patent, are patentable over the statements contained in that patent.

It is true that the theory of subdividing the electric light by means of a carbon filament, viz., a carbon burner having high resistance and small radiating surface, enables the production of a small or subdivided light, while high resistance enables the employment of such lamps in multiple arc circuits, without a prohibitive cost in conductors. But notwithstanding the knowledge disclosed by this patent, it has not been practically possible to make lamps employing a single continuous

filamentary burner having a higher resistance than that required by an electrical pressure of about one hundred and fifteen volts. Since the beginning of the practical business of incandescent electric lighting, it has been recognized as a great desideratum to produce a high volt lamp. At the start lamps were made for a voltage of from one hundred to one hundred and five, and by perfection in processes of manufacture, the highest practicable voltage has been gradually raised to about one hundred and fifteen. The difficulty in making lamps of high voltage arose from the fact that it was necessary to make the filaments of carbon finer and longer to secure that end. The practical difficulties in the way of cutting bamboo strips of great fineness increase enormously with any increase in the length of the strips. Besides this, the advances which have been made in the direction of securing lamps of higher economy, i.e., lamps giving a greater number of candles of light per horse-power of electrical energy expended, is one that has required an increased fineness of the filaments and a reduced surface and since the higher volt lamps must compete in economy, the obstacle in the way of making such lamps has become gradually greater by reason of the increased fineness required by advances in other directions. The limitation upon the extent to which the voltage of incandescent electric lamps can be raised has led to the production of a number of other remarkable inventions, which have been designed to secure the advantages of a small investment in conductors, without raising the voltage of the

lamps. This feature is what has given the value to Edison's three-wire system, which enables a double voltage to be employed, and to the alternating current converter system, which enables voltages of any range to be used on the main conductors, and to be converted at the points of consumption to the lower voltages required for the lamps.

The introduction of these inventions has made less important the securing of a high volt lamp, but competition is now reaching the point where such a lamp has again become a matter of necessity.

The present application provides the means for producing such a lamp. The method of doing this by coiling the burner, which is referred to in Edison's patent, is one which it has never been found practicable to use in the production of lamps of higher voltage than can be obtained by a simple filament without coiling, and consequently the method and construction presented by the present case are not only novel, but possess that degree of merit which entitles them to independent protection.

Rich. A. Dyer

Of Counsel for Applicant.

New York, May 26, 1894.

No. 17,132.

U. S. Patent Office, June 1, 1894.

Before the Examiner-in-Chief, on Appeal.

Application of Thomas A. Edison for a patent for an improvement in Electric Lights and Systems of Electric Lighting, filed February 5, 1880. Serial No. 2,130.

By R. R. Dyer for appellant.



The claims appealed are:

"1. An incandescence electric lamp, having in combination, a vacuum chamber made entirely of glass, two or more carbon filaments connected in series within such chamber, and leading-in wires connected to the ends of such series within the lamp and passing through and sealed into the walls of the lamp chamber, substantially as set forth.

"2. An incandescence electric lamp, having in combination, a vacuum chamber made entirely of glass and consisting of a glass support and an enclosing globe, two or more carbon filaments connected in series within such chamber and supported entirely from such glass support, and leading-in wires connected with the ends of such series and passing through and sealed into the walls of the chamber, substantially as set forth.

"3. An incandescence electric lamp, having in combination, a vacuum chamber entirely of glass, two or more arc or loop-shaped carbon filaments connected in series in such chamber, and leading-in wires connected to the ends of such series and passing through and sealed into the walls of the chamber, substantially as set forth.

"4. An incandescence electric lamp, having in combination, a vacuum chamber made entirely of glass and composed of a glass support and a glass enclosing globe, two or more carbon filaments of arc or loop-shape connected in series in such chamber and supported entirely from said glass support, and leading-in wires connected with the ends of such series and passing through and sealed into the walls of the chamber, substantially as set forth.

"5. In a system of generation, distribution and transmission of electricity for purposes of light, the method of diminishing the amount of metal required in a given length of main conductors and producing a definite candle-power of light, consisting in increasing the ratio of resistance to radiating surface in the lamps by providing each lamp with a burner of two or more carbon filaments connected in series, such filament being reduced in cross sectional area so that the combined surface of the two or more filaments will be of such an extent as to give the standard amount of light for the entire burner, while the resistance of the burner will be due to the combined resistance of the two or more filaments substantially as described."

The references are patent to

Edison, January 27, 1880, #223,893;
 British Patents Nos. 12,212 of 1864; 3809 of 1872;
 "Engineering", 1873, p. 293, fig. 1;
 Ganot's Physics, 1893, Articles 328, 330.

The essential matter of the claims to invention lies in the "two or more carbon filaments connected in series within one chamber", all else being admittedly old and well known in incandescent filament lamps. The object of using two or more filaments in series is similar to that set out in Edison's former patent cited in reference, viz: to gain a high resistance with given radiating surface, for the sake of economy in the case of the main conductors. This principle was enunciated in the former patent, and the result was therein attempted to be gained by making a very long attenuated carbonized filament and supporting it within the exhausted bulb by the diverse means pointed out. Some difficulties inhered in the making and practical insertion of this long attenuated filament. Edison attempted to overcome some of them in the patented device by coiling up his filament into a close spiral or helix, but the difficulties of making, coiling and carbonizing the long and thin filament of practically uniform caliber throughout remained unremoved. This invention of multiple, comparatively short and shaped or looped shaped filaments connected in series, so that their aggregate length, resistance, and radiating power should equal those of the less practical long helical filament of the former patent, is the improvement for which he now desires a patent.

It is clear that the device is differentiated, both in the claims and in practical construction, from the former Edison device. As for the references, first, Ganot's Physics sets forth the scientific principles involved as summed up in Joules law. The reference to "Engineering", p. 293, figures 1, relates to experiments of Sir W. Crookes with his "radiometer", and the figure referred to shows such an instrument containing a platinum loop in it.

battery circuit for giving a source of heat radiation within the bulb, variable at the will of the operator, and for comparison he joins on several such incandescent in series for simultaneous observation.

The reference to the British patent No.12,212, 1343, figure 25⁹ shows that the arc shaped loop is a very ancient form. The reference to Conn's British patent No.3309, 1372 shows a form of incandescent loop where, in the instance shown in figure 2, the current is carried from one graphite rod or stick to another within the same chamber, arranged in series. In this last reference, the only one having any pertinency, the incandescent bodies are not filaments, are not of high resistance, are not in a vacuum chamber, nor in a chamber made entirely of glass. We think therefore that applicant can hold his apparatus claims as for a useful and novel structure not shown or disclosed in the former patent, and still less in the British patent to Conn. The 5th claim, drawn as for a method or process, is really but for the natural function or operation of this incandescent loop covered by the foregoing claims, and adds nothing by way of legitimate protection.

The Examiner's decision is reversed as to claims 1, 2, 3, and 4 and affirmed as to claim 5.

H. H. Bates
R. S. B. Clarke

} Examiners-in-Chief.

APPLICATION OF THOMAS A. EDISON
ELECTRIC LIGHTING
FILED FEBRUARY 5, 1880
SERIAL NO. 2,180

HON. COMMISSIONER OF PATENTS,

S I R :-

In the above case we submit the following
amendment:--

On page 2 of the substitute specification filed February 2, 1888, line 3, erase "an" and substitute -----
adapted to be employed in -----

Page 3, erase beginning with word "and" in line 26,
through "circuit", line 27.

Erase the sixth claim.

Respectfully,

Attorney for Edison.

New York, June 7, 1894.

(2-571 a)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE,
MAILED
JUN 8 1894
Electrical Division A.

WASHINGTON, D. C., June 8, 1894.

Thos. A. Edison,
c/y Dyer & Seely,
36 Wall Street,
N. Y. City.

Subject:

Incandescent Light.

Filed Feb. 5, 1880 No. 2180



Please find below a communication from the EXAMINER in charge of the application above noted.

Room No. 61.
All communications should be addressed to
The Commissioner of Patents,
Washington, D. C.

John S. Thompson

Commissioner of Patents.

The board of Examiners in Chief have reversed the Examiner's action in rejecting claims 1, 2, 3 and 4. The Examiner is compelled to cite the following new references:- Edison 263,135 Aug. 22, 1882; 264,652 Sept. 19, 1882; 273,485 Mar. 6, 1883; 287,519 Oct. 30, 1883; 353,783 Dec. 7, 1886-Incandescent Lights-under the recent decision of the Supreme Court in Miller vs. Eagle 66 O. G. 845.

Each of the claims must be rejected on these references. To facilitate matters, this rejection may be taken as final and an appeal be had at once. Such appeal will not require a new fee.

Any communication respecting this application should give the serial number, date of filing, and title of invention.

*See how
Edison had
been as prior
to 1880*

LAW OFFICES
FRANK L. DYER,
(SUCCESSOR TO CRO & DYER),
Patent Cases a Specialty,
210 F STREET,
Washington, D. C.

June 11, 1894.



Messrs. Dyer & Seely,

36 Wall Street, N. Y.

Gentlemen:

Your favor of the 9th. inst. has been received, in regard to application of Thos. A. Edison, for Incandescent Electric Light; and in accordance with your request I have seen the examiner in charge thereof to ascertain whether or not he first obtained the authority of the Commissioner, under Rule 142, before rejecting the claims after a favorable decision by the Board. He informs me that he has always understood that that rule applies only to applicants who desire to present new or amended claims; and that in similar cases he has never obtained the consent of the Commissioner. He says however that he will consider this question, and if he finds that such consent is necessary, he will see that it is secured, sending you at the same time copies of any further papers he may file in the case.

Yours very truly

Frank L. Dyer

No enc.

(8-071a)

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE,

MATTHEW

JUN 12 1894

Electrical Division

WASHINGTON, D. C., June 12, 1894.

Thos. A. Edison,

c/o 36 Wall Street,

N. Y. City,

N. Y.

Subject:

Incandescent Lamp.

Filed Feb. 5, 1880 No. 2,180



Please find below a communication from the EXAMINER in charge of the application above noted.

Room No.-----91.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

John S. Spencer
Commissioner of Patents.

The rejection of June 8, 1894 is withdrawn per forms.

The Commissioner has on June 11, 1894 approved the Examiner's request to reopen the application for the purpose of citing new references.

These new references are Edison's patents 263,135 Aug. 22, 1882; 264,652 Sept. 19, 1882; 273,435 Mar. 6, 1883; 287,519 Oct. 30, 1883; 353,783 Dec. 7, 1886-Incandescent Lights. Each of the claims must be rejected on these references in view of the recent decision of the Supreme Court in Miller Vs. Eagle 66 O.G. 855. To facilitate matters this rejection may be taken as final and appeal be had at once. Such appeal will not require a new fee.

Any communication respecting this application should give the serial number, date of filing, and title of invention.

APPLICATION OF THOMAS A. EDISON :
: INCANDESCENT LAMP :
: FILED FEBRUARY 5, 1880 :
: SERIAL NO. 20,180 :

ROOM NO. 91.

TO THE COMMISSIONER OF PATENTS,

S I R :-

In reply to the Examiner's letter of June 12, 1894, it is respectfully submitted that the several Edison patents referred to by the Examiner are upon detail features of construction or method of manufacture which were invented subsequent to the filing of this application. They are for distinct inventions from that presented by this application, and are based upon features not shown by this application: Patent No. 263,135 covers a peculiar circuit controller external to the lamp, which is not found in the present application. Patent No. 264,652 covers a peculiar method of preparing two or more contiguous carbon filaments, which method is not in the present application. Patent No. 273,485 covers a peculiar method of introducing the filaments into the globe and a special combination not in the present application. Patent No. 287,519 covers a peculiar construction for supporting the filaments from the top of the globe, not found in the present application. And patent No. 353,783 covers a particular construction for supporting a coiled filament, not in the present application.

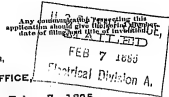
In the case of Miller v. Eagle, the later patent was based upon the same construction as the earlier patent and claimed a different function of that same construction. The second patent was, as the Supreme Court held, one upon the same invention. The doctrine of the Supreme Court goes no further than the practice which has been prevalent in the Patent Office for a number of years with respect to the divi-

2-071 a.

Room No.91 (Diet)
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., Feb. 7, 1895.



Thos. A. Edison,
c/o Dyer & Seely,
36 Wall St.,
New York.



Please find below a communication from the EXAMINER in charge of your application
for Electric Lights and On Systems of Electric Lighting, filed
Feb. 5, 1880, Ser. No. 2180.

James S. Seymour

Commissioner of Patents.

On reconsideration it is held that this application comes
within the decision in ex parte Edison, 49 O.G. 1691 and the re-
jection is withdrawn. The foreign patents should be acknowledged
in the preamble of the specification when allowance may be had.

APPLICATION OF THOMAS A. EDISON
ELECTRIC LIGHTS & SYSTEMS OF ELECTRIC LIGHTING
FILED FEBRUARY 5, 1880
SERIAL NO. 2180
ROOM NO. 91

TO THE COMMISSIONER OF PATENTS,

SIR:

We hereby appoint Dyer & Driscoll (a firm composed of Richard N. Dyer, Daniel H. Driscoll and Samuel O. Edmonds), of No. 36 Wall Street, our associates in the prosecution of the above-named application, and request that all future communications be addressed to them, and that the Letters Patent when issued be forwarded to them.

Respectfully,



Attorneys for Edison.

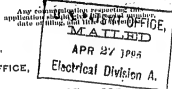
New York City, February 28th, 1895.

2 671 a.

Room No.91 (Dict)
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., April 27, 1895.



Thos. A. Edison,
c/o Dyer & Driscoll,
36 Wall St.,
New York.



Please find below a communication from the EXAMINER in charge of your application

for Electric Lighting, filed Feb. 5, 1880, Ser. No. 2180.

Wm. S. Sigman
Commissioner of Patents.

The Supreme Court having decided that the date of patenting, not the date of application, controls in the question of limiting the term of a United States patent by a prior foreign patent to the same applicant, and applicant having certain foreign patents which have expired, it follows that this application is dead.

**Abandoned Patent Applications, Case 237
Dynamo or Magneto-Electric Machines
(filed August 9, 1880)**

ABANDONED APPLICATION OF

Thomas A. Edison,

For Dynamo or Magneto-Electric Machines,

Filed August 9, 1880, Ser. No. 15,037.

-----00-----

In using megneto or dynamo-electric machines, it is very important that the armatures should be rotated at an uniform and constant speed, as any variation therein immediately manifests itself in the current.

As ordinarily used, such machines are connected to the prime motor by intermediate gearing, usually belts, which are liable to slip, causing irregularity in the rotation of the armature or bobbin, every such irregularity effecting the current, causing the irregularity to be repeated and shown, in the operation of whatever translating devices are used in the circuit.

To obviate this it is preferable to connect the prime motor, and the generator directly, that is, supposing the prime motor to be a steam engine, the pitman-rod of the engine is connected directly to the shaft, or axil, of the revolving bobbin, preferably by a crank pin on a disk upon the end of the bobbin shaft, which disk is weighted upon the side opposite to the crank pin, with a weight which counterbalances the weight of the pin and pitman, so that any jar, or irregularity, in passing dead centers, is obviated. This arrangement is especially needed as the engine used should be one of very rapid stroke, not less than 4 to 500 per minute, in order that the bobbin may receive its needed high rate of

rotation. The engine should also be what may be called a "self contained engine", that is, provided with a governor and an automatic variable cut-off, which may be so adjusted that upon the speed becoming too great, the cut-off shall be automatically changed to cut off at a less fraction of the stroke, and vice versa.

Of course, as the speed of the engine lessens, the rate of the rotation of the bobbin is lessened, and consequently the electric motive force, or "pressure", of the generated current drops.

If the steam engine and generator be so arranged, there is provided a system of generation, in which, automatically the pressure, or force of the current may be maintained constant.

In manufacturing generators of large capacity, very large cores, and very large castings for polar extensions are required. These very large parts cost more proportionately than small ones, and are much more difficult to handle, the winding of them requiring greater labor and care.

The greatest effect upon the cores is given by the coils nearest to it, but in using very large cores, some of the coils are necessarily somewhat distant from the core.

With several smaller cores, whose aggregate of weight is that of one larger core, a larger surface for the action of coils may be obtained, and a larger amount of wire used, whose average distance from the surface of the cores in either case, is the same.

Generation, of very great capacity, may therefore be

profitably constructed of a series, two or more, of coils and cores, or field magnets, each set having its own polar extensions, but one armature or bobbin common to all being used.

By such construction, as before explained, ease and economy of construction are secured, the coils are brought on an average, nearer their cores, and a greater amount of wire may be profitably used.

Moreover, if at any time it is desired to increase the capacity of the generator, it may be done by adding more field magnets to those already in the generator, the only new part required being a proportionately larger bobbin.

As insuring compactness and strength, it is preferable to mount the engine and generator upon one base, on which is secured, upon intermediate supports of a non-magnetic substance, the generator, the non-magnetic supports being necessary to avoid the formation of a magnetic circuit outside of the polar extensions.

In order to give greater rigidity and needed support to the generator, the series of polar extensions are united physically by a brace or union of non-magnetic material, which in effect, makes the opposite poles one structurally but preserves them separate, magnetically.

CLAIMS.

1. A magneto, or dynamo-electric machine, consisting of a series, two or more, of independent field of force magnets, and a single armature, or bobbin, common to them all, substantially as set forth.

2. The combination of a magneto, or dynamo-electric machine, a steam engine connected thereto, by a counterbalanced connection, a governor and variable cut-off, automatically controlled thereby, and an armature or bobbin, serving both as an armature, or bobbin, and as a fly or balance wheel, substantially as set forth.

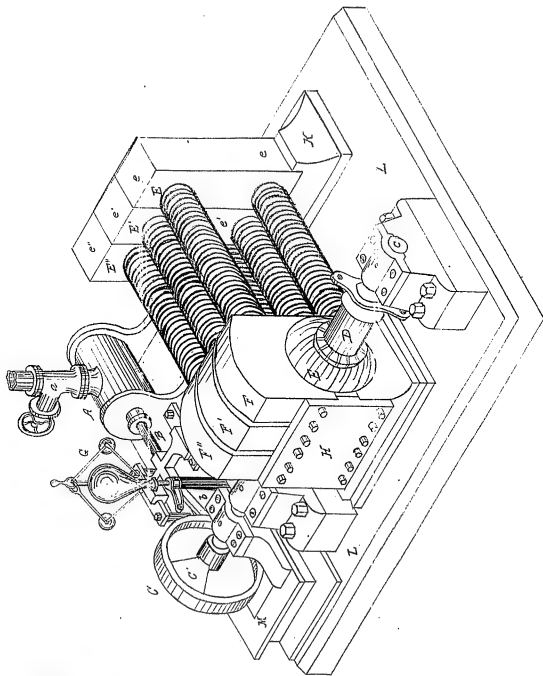
3. The combination with a common base, of an automatically controlled engine, a magneto, or dynamo-electric machine, and non-magnetic supports placed between the generator and the base, substantially as set forth.

4. The combination with the polar extensions, of independent electro magnets, forming with a bobbin common to them all, a generator, of a non-magnetic plate or brace uniting and supporting the polar extensions, substantially as set forth.

5. The combination of a generator, a high speed steam engine, and a variable cut-off and governor, so that the speed of the engine and the force or pressure of current are automatically regulated, substantially as set forth.

Electricity
Mach. No. 15037

L.N. 15037



Attache
S.D. Mot.
Journ. No. 15037

Commissaire
Chas. H. London
per D. J. & H. H. H.
Atty.

Abandoned Patent Applications, Case 592
Electric Generators
(filed October 10, 1883)

ABANDONED APPLICATION of
Thomas A. Edison,
for Electric Generators,
Filed Oct. 10, 1883,
Serial No. 108,561.

The object I have in view is an arrangement and construction of electrical generators and operating steam engines, adapted for employment in any location where one or more dynamo or magneto-electric machines would be used, but especially suitable for use in a central station plant, for supplying electricity to conductors of a system of general distribution, wherein a continuous and constant pressure is maintained on the mains, or in other locations where two or more generators are employed, feeding separately into the same circuit. For such a plant I provide separate and independent high speed and high pressure steam engines, for operating the dynamo or magneto-electric machine, the advantages possessed by this construction over the use of a large low speed and low pressure engine for running all of the machines, being of vital importance in a general system of electrical distribution.

There is greater economy in running generators by separate high speed engines, since the number of engines in operation can be changed as required by the work to be done, or the number of translating devices in circuit. To get a certain speed with a large low speed engine, a definite boiler pressure has to be maintained, no matter how small the load

upon the engine may be.

Hence, there is a great loss of power when the load is small, which loss increases largely as the load is decreased below the point of greatest economy.

With the large low speed engine, when the load is small, the friction becomes an important factor in the work of the engine and the economy is greatly lessened.

These difficulties are not met with when a number of separate high speed engines is used, since the engines can be thrown out of operation as the load decreases, and the engines left running be worked with great economy.

The boilers of which there would be a number, preferably the same number as the engines, can be thrown out of operation and hence the boilers can also be worked in the most economical way.

With the large low speed engine, an extra engine of equal power would have to be provided for operating the machines, in case the first engine should break down, or had to be stopped for repairs, cleaning or for other purposes. This makes it necessary to have double the engine capacity required for running the machines, making the investment for engines larger than when separate engines are used, since with the separate engines I have found that one extra or spare engine in every six is sufficient, making the reserve capacity only one-sixth the entire capacity and this proportion might be still further reduced.

In addition, with the large engine, the breaking down of such engine would cause the total extinguishing of the lamps for a time, until the reserve ^{engine} could be started;

but with a number of separate engines, when one engine breaks down the load is taken by the other engines, and the lamps are not extinguished, but only a momentary drop in the candle power occurs, which is instantly corrected by the regulation of the generators in the manner hereinafter stated.

The wear upon the separate engines is also less, since they will be thrown out of operation a much greater proportion of the time than the large engine.

A most important commercial advantage is the large saving in the investment for real estate for a central station, plant, it being possible to place the separate engines, with the small reserve power, in much less space than is required by the two large engines, with the necessary shafting, belting, clutches, etc.

The dynamo or magnetic electric machines and steam engines are made of the same capacity and each dynamo or magnetoelectric machine is mounted upon the same base or bed with a steam engine. This base is preferably made of cast iron, formed in convenient sections, bolted or otherwise suitably secured together, to form a solid support for the combined machine.

The engine and dynamo have their shafts placed in line with each other, and connected directly together to form a shaft common to both the engine and dynamo. The dynamo may be of any desired size. I have found that dynamos capable of supplying economically about fifteen (1500) hundred sixteen (16) candle incandescing electric lamps, are well adapted for large central station plants.

By the use of the direct connection between the engine and dynamo, great economy results, since no power is lost in intermediate shafting, or from the pull or slip of belts; the use of clutches is avoided, for connecting the dynamos with and disconnecting them from the shafting.

There is no ^{danger} \wedge of stoppage from breaking of belts or from the breakage or disarrangement of other parts of the intermediate mechanism, as there would be with the low speed engine and its shafting. The direct connection makes the combined machine simple and reliable, and adds greatly to the compactness, which is a feature of great importance, in that less room is required for the plant and the investment in real-estate diminishes.

With the high speed engines, the movement is uniform and a steady current is produced; the movement is made more uniform by the inertia of the armature, which has considerable weight.

For a high speed engine, I have found that one making three hundred and fifty (350) revolutions per minute is suitable for the purpose, ^{to work} but it is evident that the dynamo could be constructed ~~at~~ at a different speed.

I also prefer to use a high boiler pressure. About one hundred and ten (110) lbs. is an economical pressure; but it is evident that a lower pressure could be employed.


The high speed steam engines used by me are provided with automatically variable cut off mechanisms.

Engines of this kind possess the general advantage over throttling engines, of a greater economy in the use of steam, and the especial advantage when used to operate dynamo

or magneto-electric machines, connect with a feeding into the same circuit, of closer regulation and greater uniformity of speed.

Throttling engines are wholly unsuited for the purpose, on account of the loss of power, and on account of the want of uniformity in speed.

It is necessary that the engines should not vary more than about three percent (3%) in speed, and within this the regulation of the engine must be performed.

A greater variation would cause the dynamos to differ in electromotive force to such an extent, that those of lowest electromotive force at any given time would be converted into electro dynamic motors and be run as such by the dynamos of greatest electromotive force; this relation would be reversed by the movement of the governors, and in this way the power would be partly used up in the plant itself, and there would be an over loading of part of the dynamos accompanied by extra commutators sparking at the  and over heating of the armatures.

The most effective governor for cut off engines for my purpose I have found to be a spring governor, that is, a governor in which centrifugally acting weights are opposed by heavy springs.

The springs overcome the inertia of the weights and the governor responds almost instantly to the slightest variation in speed, making all the engines work practically in unison, so that the difference in electromotive force of the dynamos are not sufficient to cause the unequal loading of the machines.

But I do not wish to limit myself to engines with spring governors, since the variable cut off mechanisms may

-- G --

be worked by other forms of governor, as for instance, by centrifugally acting weights opposed by gravity, instead of springs, or engines worked by the two forms of governor could be used together.

With the base common both to the steam engine and the dynamo electric machine, the direct connection between the engine and armature shafts, and the automatically variable cut off, the combined machine becomes a self-contained electrical generator, controlled by and accommodating itself to the external load, automatically and with economy ^{and} _{suitable} for use in a central station plant.

The automatically variable cut off engine and the dynamo have a combined action and react one upon the other.

An increase in the number of lamps in the circuit throws more work upon the dynamo, and this in turn causes the cut off of the engine to act at a later point in the stroke, admitting more steam into the cylinder and increasing the power of the engine; a decrease in the number of lamps in circuit, has the reverse effect upon the dynamo and engine.

In a central station plant there is a mutual action and reaction of the dynamos and cut off engines, ^{which} _^ is caused by the fact that the dynamos are connected with and fed into the same circuit.

Suppose, for illustration, the maximum capacity of each dynamo to be 1500 lamps, and that there are 4 dynamos in connection with the circuit and supplying 6000 lamps. Now the load will be equally distributed among the combined dynamos and engines, 1500 to each combined machine, and the cut off of all the engines will be acting at the same point.

As the lamps are gradually reduced in number, the

cut offs & all the engines will vary in unison, cutting off steam earlier in the stroke, until there are but 4500 lamps in circuit, 1125 to each dynamo, or something less than that number; then the connection of one dynamo with the circuit can be broken and its engine stopped. The entire load is then thrown upon the three dynamos, which react upon the cut offs of their engines and cause them to change in unison the point of cut off to meet the increase of load. If more lamps are taken off, the same operation takes place, until the number of lamps is reduced to 3000 or somewhat under that number, when another machine is disconnected from the circuit. The reverse operation takes place when lamps are being added to the circuit.

When a machine breaks down and has to be stopped, the other machines take the load, dividing it up among them and acting in unison until an additional machine is started, when another division of the work takes place.

The engines have to regulate in unison and quickly, in order to prevent the over loading of part of the dynamos, and this can only be accomplished by the use of the self contained generators.

The generators are preferably dynamo electric machines, having their field magnets in separate multiple, arc circuits, derived from the main circuit, but a separate exciter may be employed.

The lamps or other translating devices are arranged in multiple arc, and a change in the number of such translating devices produces variations in the arrangement of resis-

tences and in the electromotive force of the machine independent of the speed at which the machine is driven.

To compensate for this variation and electric motive force, another species of regulation has to be resorted to, in addition to that furnished by the automatically variable cut offs of the engines.

For this purpose, the strength of the field magnets is varied, by varying in unison and to the same extent the current flowing through the field circuits of the several machines.

This may be accomplished by the use of an adjustable resistance in the field circuit of each machine, all the resistance adjusting arms being operated simultaneously by a common shaft.

C L A I M S .

1. A self contained electrical generator, composed essentially of the following parts, viz; a dynamo or magneto-electric machine, a high speed steam engine, having an automatically variable cut off, a direct connection between the shaft of said steam engine and that of said dynamo or magneto electric machine, and a supporting base or bed common both to said steam engine and said dynamo or magneto-electric machine, the parts being arranged and combined substantially as set forth.

2. A self contained electrical generator having in combination, a dynamo or magneto electric machine, a high speed steam engine provided with a variable cut off, and a spring governor, varying such cut off automatically, a direct connection between the shaft of said steam engine and that of said dynamo or magneto electric machine, and a supporting base or bed common both to said steam engine, and said dynamo or magneto-electric machine, substantially as set forth.

3. In a self contained electrical generator of the character described, the combination with the common bed plate, of a high speed automatic cut off steam engine, and a dynamo or magneto electric machine mounted thereon, and a compensating coupling connecting directly the shafts of the engine and dynamo or magneto-electric machine, substantially as set forth.

4. The combination with the high speed steam engine and the dynamo or magneto electric machine -----

-- 10 --

coupled directly together, of the common sectional bed plate, substantially as set forth.

5. The combination with the high speed steam engine and the horizontally arranged dynamo or magneto-electric machine coupled directly together, of the common sectional base, provided with ^{an} elevated portion for the steam engine and a depressed portion for the generator, substantially as set forth.

6. The combination with the high speed steam engine and the horizontally arranged dynamo or magneto-electric machine coupled directly together, of the common sectional base, provided with an elevated portion for the steam engine, a depressed portion for the generator and a wing for the yoke of the generator magnet, substantially as set forth.

7. In a dynamo or magneto-electric machine, ~~one~~ ^a ~~or both~~ polar extensions of the field magnet made in mechanically separable sections, substantially as set forth.

8. In a dynamo or magneto-electric machine, the back yoke of the field magnet, made in mechanically separable sections, substantially as set forth.

9. In a dynamo or magneto-electric machine, one or more extra magnet cores secured to separate sections of the polar extensions and a back yoke, substantially as set forth.

St. Louis, Mo. - June 2

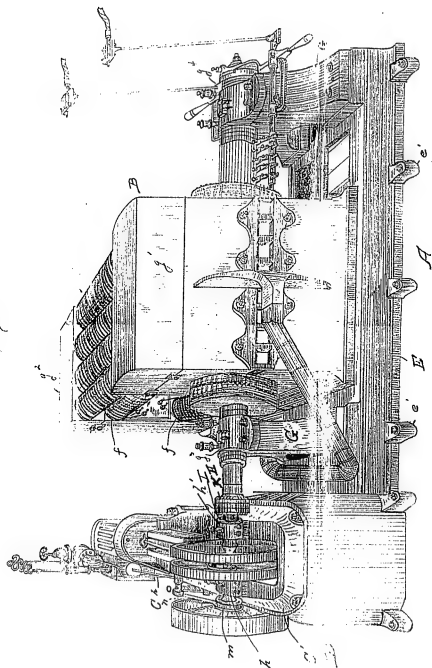
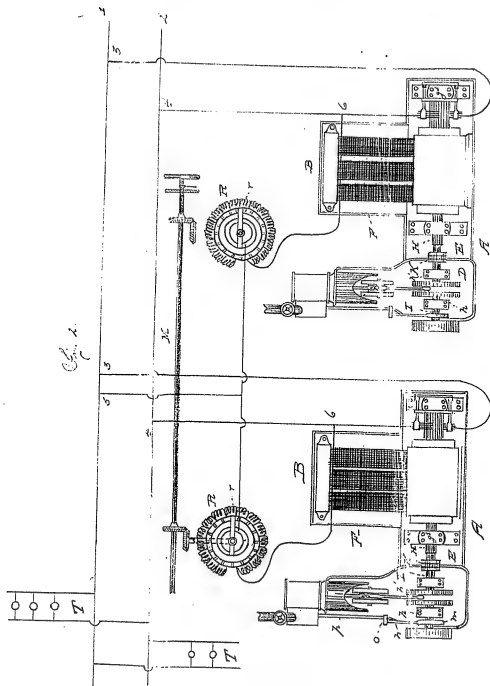


Fig. 1.

C.
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 C.

Electricity
Magnetism

Pat. 105,561
Sheet 2



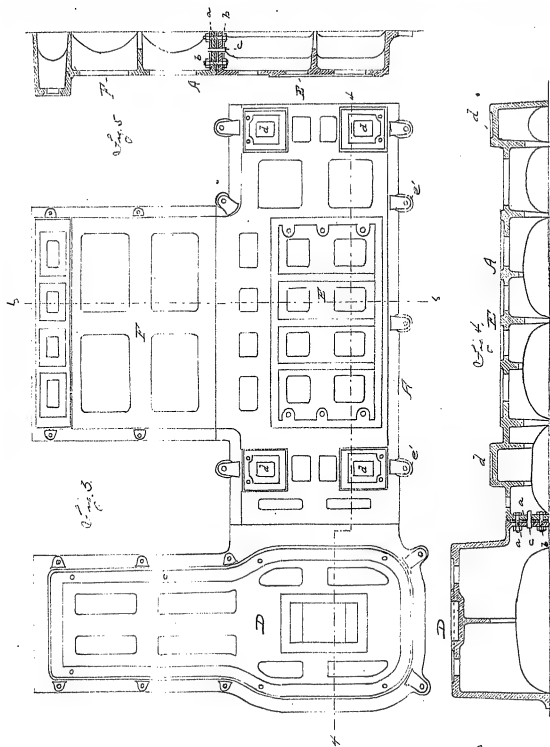
Attended
C. C. Brown
E. H. Cullen

Inventor:
Chas. A. Edison
By Chas. F. Jones,
Att'y

Dec 1880

Magnetic Electric

Sheet 10 - Sheet 13.



Attest:

E. C. Rowland

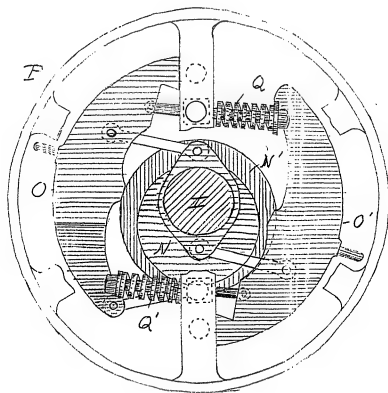
L. H. Soley

Inventor:
Thomas A. Edison

By Rich. D. Joyce.

Atty

Fig 6



Attest
C. C. Rouse and
H. H. Rouse

Inventor
Thomas A. Edison
By Oliver W. Dyer
Atty.

Abandoned Patent Applications, Case 663
Railway Signaling Apparatus
(filed February 16, 1886)

Serial No. 192094.

Thomas A. Edison
of
Menlo Park.

Railway Signalling Apparatus.

1. Office with signal July 29, '86.

2. Filed Feb'y 16, '86.

3. Rejected April 6, '86.

4. Amended Oct. 12th, 1886.

and new drawing filed.

5. Rejected Nov. 2, 1886.

6. Return to office Dec. 31, '86.

7. Rejected Feb'y 1, '87.

8. Amended, Oct. 1887.

9. Return from office Oct. 26/87.

10. Amended Oct. 12/87.

11. Rejected Nov. 14/87.

12. to O May 16/91

13. Rejected May 20/91

14. to O March 10/92.

15. Rejected March 21/92.

Write to Edison

Forwarded Feb 15/92

666 Office No.

My invention relates to the system of railway signalling invented in Great Britain by William O'Byrne Smith & Co. 27, 124 wherein communication is had with a train in motion by induction between a line wire at the side of the track and a conductor carried by the train, forming opposing condensing surfaces.

My object is principally to produce a more simple and efficient form of the train conductor than heretofore proposed, which, while applicable generally to trains of all kinds adapts the system more especially for use with freight trains.

I have found that the greater the length of the train conductor parallel with the line wire the better is the effect and that the increase of length in the train conductor is far more beneficial than increased width although there may be the same area of condensing surface in either case. This would seem to be due to the fact that the effective opposing condensing surface of the line wire is dependent upon the length rather than the width of the train conductor.

I have also found that when the train conductor is of considerable length it may be

2

a wire or ribbon sufficiently small to have the characteristics of flexibility.

In carrying out my invention which is based upon these discoveries, I use for the train conductor a flexible conducting cord or rope, ^{Continuous or unbroken from end to end which contains} which is carried by a reel in a car of the train, as the caboose of a freight train, in which is also located the signal transmitting and receiving apparatus. This conducting cord is several hundred feet long, a sufficiently so to extend the entire length of a freight train. It is run out over the tops of the cars after the train is completed and is coiled on the reel before the train is broken up.

16

To secure a good ground connection for the train conductor the flexible conducting cord is preferably made double and is carried when uncoiled from the caboose forward to the locomotive where one of its conductors is connected with any suitable part of the locomotive. The caboose may however be arranged for making a ground connection through its wheels, in which case the flexible cord would only be a one part conductor. For transmitting and receiving instruments telephones may be used as proposed in the patent

26

3.

of whistle referred to, although I prefer to work by Morse or numerical signals rather than by spoken words and to use the apparatus described in applications for patents ^{of even date herewith} ~~herewith~~ filed by myself and Capt. Gililand.

a/

In the accompanying drawing joining in part herof, -

Figure 1, is an elevation of a freight train having my invention applied thereto, the caboose being broken away to show reel and signalling apparatus in diagram;

Figure 2, a view of reel partly in section with train conductor therefrom and signalling apparatus in diagram;

Figure 3, a diagram illustrating a one part train conductor;

Figures 4 and 5 detail views of the two part conductor; and

Figure 6, a detail view of a one part conductor.

sub B.

The line wire at the side of the track may be one or more of the ordinary telegraph wires or poles designated by A. The freight train shown in figure 1, is composed of the locomotive B, box cars C and caboose D.

In the caboose is located a reel D

upon which is wound the flexible
conducting cord or rope & forming the
train conductor. This is prepared from
the reel through the top of the carbox
and over the top cone to the locomotive.

The conducting cord & may have two
conductors - 1, 2. Conductor 1 is a
small wire forming the core of the cord.
This wire is covered with insulation
a, over which is rope b. Over this
wound spirally the second wire c, in-
sulated by d, and then the whole is
covered by a braiding of hemp e, form-
ing a flexible cord or rope which can
be readily handled, reeled up and
unreeled as desired. At the locomotive,
conductor 1 is connected with some
metal part to form a good ground
connection as shown in figure 2.

At the reel, conductors 1 and 2 are
connected with rings f, f' on the shaft
of reel, which rings are insulated from
each other. Contact springs rest on
these rings as shown and maintain
connection with the conductors 1, 2, and
in a loop between the two conductors
is located the induction signal trans-
mitting and receiving apparatus, which

Sub C.

is shown at F. This apparatus it will
there be seen is located in a ground
connection with the train conductor or
conducting surface, and a good ground
is secured through the locomotive and the
track.

Should a one part conducting
cord G^o be used (figures 3 & 6)
the wire forming the single train
conductor will be connected with
shaft of reel and the signalling appa-
ratus will be located between a cable or
spring on that shaft and the ground
through the wheels of the carboad

Cord G^o has a central wire 3, in-
sulation 4, rope 5 and hemp braided
covering 6. It will run forward to
locomotive but will have no electrical
connection with the metal parts thereof.

Should the invention be applied to
passenger trains, the reel and sig-
nalling apparatus could be put in a
baggage or other car, which with a
flexible
one part conducting cord could be at
either end of train, (but with the two
part conducting cord would be neces-
sarily located at the rear of train.)

6.

as my invention and desire to secure by letters Patent
that I claim, is, —

First: In railway signalling apparatus,
the train conductor composed of a
flexible conducting cord or rope ex-
tending over the tops of the cars, sub-
stantially as set forth.

5th

Second: In railway signalling apparatus,
the combination with a train conductor
composed of a flexible conducting cord
or rope, of a reel upon which the
same is wound, substantially as set forth.

Third: In railway ^{induction} signalling apparatus,
the combination with a train conductor
composed of a ^{continuous} flexible conducting cord
or rope, ^{extending over the tops of the cars} and signal transmitting and re-
ceiving apparatus located in a ground
connection from such conductor, sub-
stantially as set forth.

Fourth: In railway ^{induction} signalling apparatus,
the combination with a train conductor
composed of a ^{continuous} flexible conducting cord
or rope, ^{extending over the tops of the cars} of a reel upon which said
cord is wound, and signal transmitting
and receiving apparatus connected at said
reel with said conducting cord, sub-
stantially as set forth.

7
Fifth: In railway signalling apparatus, the combination with the double train conductor, of a ground connection at one end with one of such conductors - ^(a) signal transmitting ^(b) and receiving apparatus connected between such conductors at the other end, substantially as set forth.

Sixth: In railway signalling apparatus, the combination with a train conductor composed of a two part flexible conducting cord or rope, of a reel in rear car of train upon which said cord is wound, a ground connection at locomotive for one conductor of said cord, ^(a) signal transmitting ^(b) and receiving apparatus connected between the two conductors at the reel, substantially as set forth.

APPLICATION OF THOMAS A. EDISON

RAILWAY SIGNALLING APPARATUS

FILED FEBRUARY 16, 1886

SERIAL NO. 192,094 (Edison's No. 663)

CLAIMS.

1. In railway inductive signalling apparatus, the combination with the line wire, of the train conductor composed of a continuous flexible conducting cord or rope extending without break lengthwise of two or more cars of the train, and electrical signalling apparatus connected with said train conductor, substantially as set forth.

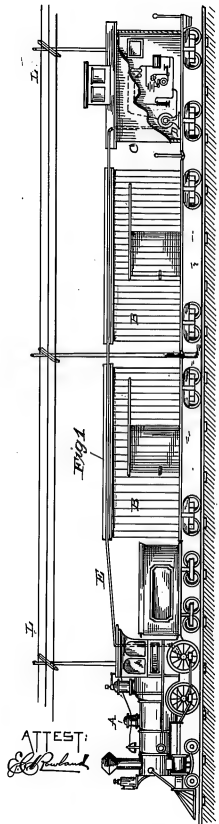
2. In railway inductive signalling apparatus, the combination with the line wire of the train conductor composed of a continuous flexible conducting cord or rope extending without break lengthwise of two or more cars of the train, a reel on which said train conductor is wound and electrical signalling apparatus connected with said train conductor, substantially as set forth.

3. In railway inductive signalling apparatus, the combination with a train conductor composed of a continuous flexible conducting cord or rope extending without break lengthwise of two or more cars of the train, and signal transmitting and receiving apparatus located in a ground connection from such conductor, substantially as set forth.

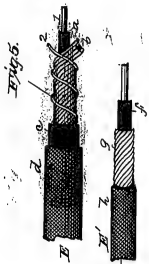
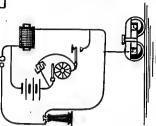
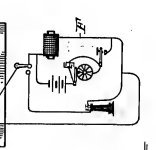
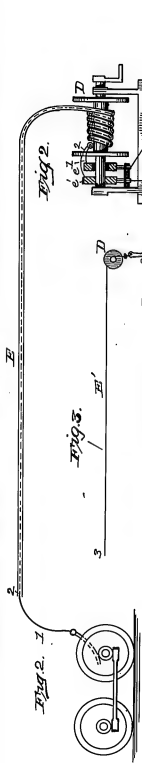
4. In railway inductive signalling apparatus, the combination with a train conductor composed of a continuous flexible conducting cord or rope extending without break lengthwise of two or more cars of the train, of a reel upon

which said cord is wound, and signal transmitting and receiving apparatus connected at said reel with said conducting cord, substantially as set forth.

Al. and d. d. d.



ATTEST:
Ed. R. ...



INVENTOR:

(2-020.)

Room No. 20.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

{ SERIES OF 1880.

No. 192,094

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D. C. Feb 16, 1886

SIR:

I have to acknowledge the receipt of the petition, specification, and drawing of your
alleged improvement in

' Railway Signalling Apparatus '

with Fifteen Dollars as the first fee payable thereon.

The papers are duly filed, and your application for a patent will be taken up for
examination in its order.

You will be duly advised of the examination.

Very respectfully,

M. W. Montgomery

Commissioner of Patents.

Thomas A. Edison

of Leyer & Seely

No. 65-67 Ave N.Y.C. N.Y.

NOTE.—In order to constitute an application for a patent, the inventor is by law required to furnish his petition, specification, oath, and drawings, (where the nature of the case admits of drawings,) and to pay the required fee.

No application is considered as complete, nor can any official action be had thereon, until all its parts, as here specified, are furnished in due form by the inventor or applicant.

(1216—5) 1886

Any communication respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE,
MAILED.
APR 7 1886

WASHINGTON, D. C., April 6, 1886,

Thomas A. Edison,

Care Dyer and Seely,

New York City,

Subject: Railway Signals,

Filed Feb. 16, 1886, No. 192,094.

Please find below a communication from the Examiner in charge of the application above noted.

W. M. Montgomery

Commissioner of Patents.

Room No. 91.

(5220-19 M.)

the
The reason for the use of double conductor E, and the special arrangement of the transmitting and receiving instrument therein, is not clearly described. While only one end of this conductor is grounded and the advantaged of such arrangement should be clearly set forth.

Claim 1 is rejected on patent to Nees, and Sherman, 207,538, Aug. 27, 1878, R.R. Car Telegraphs, and English patent 2335 of 1869.

Claim 2 is rejected on English patents 2814 of 1855, and 3521 of 1874.

Claim 3 is indefinite in form, but is met by patent to Gilliland, 266,906, Oct. 31, 1882, R.R. Car Telegraphs,

Claim 4 is rejected on the references cited for claim 2,

Action on claims 5 and 6 is suspended until further information is given is given regarding the subject thereof.

Dyr -

Edison says

cut out the arrangement
of double conductor
shown in his application
for use of Cables on
trains, ~~Electric~~
Telegraph

Gibbs

Sept 29th

Dyer

The Peoples Ecology Co.
Trenton, N.J.

Thomas A. Edison.
Railway Signalling Apparatus.
Filed February 10th, 1888.
Serial No. 193,004.

Commissioner of Patents,

Sir:-

In the above case we submit the following:

Cancel the drawing and substitute the new drawing filed herewith.

On 2nd page of specification substitute for "which" in 6th line the words, --- continuous or unbroken from end to end, which flexible conducting cord or rope ---

In same page erase commencing with 10th line through "conductor" in 20th line.

On 3rd page insert after 6th line the following:

a
--- This apparatus will be located between the flexible conducting rope and the ground. A ground connection will be made through the wheels of the caroose or other car carrying the reel, and from this a circuit wire will run through the transmitting and receiving instruments to the conductor on the reel, the free end of this conductor having no ground or other connection. ---

On same page, erase commencing with 10th line through 11th line and insert:

B. [--- Figure 2, a diagram illustrating more fully the connections; and

Figure 3, a detail view of the flexible conducting rope. ---

On 4th page insert --- preferably, --- before "carried"

in 3rd line.

Phrase commencing with 4th line 4th page through 5th page and insert:

--- This flexible conducting cord or rope is continuous or unbroken from end to end. It is composed of a conducting wire a, which is covered with insulation g; over the insulation a is wound rope g and this in turn is covered by a braided hose covering h. The inner end of the flexible conducting rope is connected with the reel, and the wire a, is laid bare and connected electrically with the reel shaft of the reel. The other end of the rope which is run forward over two ^{or} more cars, preferably to the locomotive, has no electrical connections. The signal trans-acting and receiving apparatus which is shown at f is located in the line of a circuit also g which extends from the shaft of the reel to the ground through the wheels of the car, or other car carrying the reel, and the rails upon which such wheels travel. Should the invention be applied to passenger trains, the reel and signalling apparatus could be put in a baggage or other car at either end of the train. ---

Phrase 1st and 2nd claims and insert:

--- FIRST: In railway inductive signalling apparatus, the ~~conducting the line wire of the~~ train conductor composed of a continuous flexible-conducting cord or rope extending without break lengthwise of two or more cars of the train, substantially as set forth.

--- SECOND: In railway inductive signalling apparatus, the train conductor composed of a continuous flexible conducting cord or rope extending without break lengthwise of two or

See

said train conductor

more cars of the train, in combination with a reel upon which the same is wound, substantially as set forth. ----

In 3rd claim, insert --- inductive --- before "signalling" in 1st line, and in 3rd line insert --- continuous --- before "flexible".

In 4th claim insert --- inductive --- before "signalling" in 1st line, and in 3rd line insert --- continuous --- before "flexible".

Draw 24th and 25th claims.

Respectfully,

Atty's for Edison.

New York, October 13th, 1890.

Abandonné

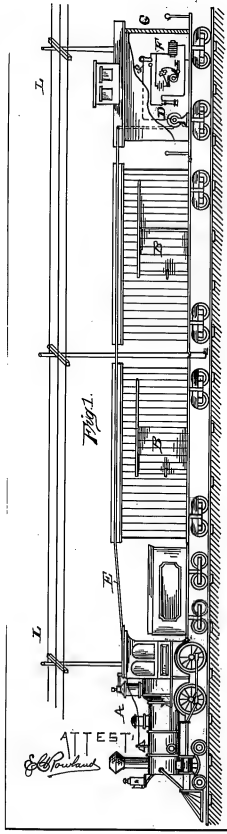
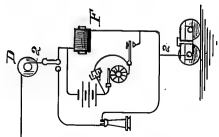


Fig. 2



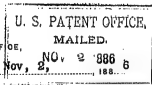
INVENTOR

Traced Oct. 15th 1886.
E. B.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(2-1261)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C.,



T. A. Edison,

Care Dyer and Seely,

N. Y. City.

Subject:

R. R. Signals.

Filed Feb., 16, 1886. No. 192,094

Please find below a communication from the Examiner in charge of the application
above noted.

A large, stylized handwritten signature in cursive script, reading "M. V. Montgomery".

Commissioner of Patents.

Room No. 91.

The substitute drawing and amendment in this case illustrates and describes an entirely different invention from what was originally presented in the case and cannot be allowed herein. The system involved therein is an independent invention and cannot be considered in connection with this case.

Thomas A. Edison.

Railway Signalling Apparatus.

Filed February 18th, 1880.

Serial No. 192,094. (Edison No. 683).

Commissioner of Patents,

Sir:-

In reply to the Official Letter of November 2nd, 1880 the following is submitted:

When this case was first filed, the drawing illustrated two forms of the flexible conducting cord, viz: the double cord shown in figures 1, 2, 3, 4 and 5 of the original drawing and the single cord illustrated by figures 3 and 6 of that drawing. The object of the double cord was to secure an earth connection at the locomotive while with the single cord, the earth connection was made at the battery.

After the Office letter of April 6th, 1880, some doubts arose as to the operativeness of the apparatus when the double cord was employed. To avoid criticism of the patent on that point, it was decided to confine the illustration of the invention to the single cord arrangement. Hence a new drawing was filed of which figures 2 and 3 are copies of figures 3 and 6 of the original, and figure 1 is like figure 1 of the original except that the single cord is substituted for the double cord. The invention has not been changed in the least, and the present claims are just as applicable to the double cord as to the single cord. No new matter has been added to the case.

Respectfully,

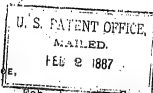
Atty's for Edison.

Enc 3/86

(All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C.")

(2-085.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,



WASHINGTON, D. C., Feb. 1, 1887.

T. A. Edison, } Application for patent Railway-Signals.
Care Dyer and Seely, }
N. Y. City. }
Filed Feb. 16, 1886. No. 192,094.

Please find below a communication from the Examiner in charge of the application
above noted.

McMontgomery

Commissioner of Patents.

Room No. 91.

(7012-20 M.)

Claims 1 and 2 do not cover an operative device; the construction covered by said claims would effect no result. These claims are objectionable. The subject matter of claim 3 is shown in patents to Gilliland 266,806 Oct. 31, 1882, and Selden 291,095, January 1, 1884, "R. R. Car Telegraphs".

The subject matter of claim 4 is shown in English patents 2814 of 1885 and 3521 of 1874.

Thomas A. Edison,
Railway Signalling Apparatus,
Filed February 16th, 1896.
Serial No. 192,004. (Edison No. 633)

To the Commissioner of Patents,

Sir:-

With regard to the 1st and 2nd claims, the criticism of the Examiner would be well taken if the claims were for combinations, but being for the peculiar construction of a device, which is a well recognized element of a publicly introduced apparatus, the objection does not apply.

In 3rd and 4th claims insert after "rope" in 4th line of each claim the words ---- extending without break for distance of two or more cars of the train ----

Respectfully,

Att'ys for Edison.

New York, October 6th, 1897.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(2-1011)

DEPARTMENT OF THE INTERIOR U. S. PATENT OFFICE,
UNITED STATES PATENT OFFICE, MAILED.
WASHINGTON, D. C. Oct. 27 1897.
Oct. 28 1897.

T. A. Edison,

Care Dyer & Seely,

65 5th Ave.,

N. Y. City.

Application for patent for
Railway Signals.

Filed Feb. 16, '96. 192,094.

Please find below a communication from the Examiner in charge of the application
above noted.

Room No. 21.

(201)-29 M.)

A. M. Montgomery
Benton J. Hall
Commissioner of Patents.

The objection raised in last office letter is repeated
claims 1 and 2 do not cover any patentable invention.

The Eng. patents, cited for claim 4, show what is set forth
in claims 1 and 2, there is no break, electrically speaking, in
the continuous flexible conductors shown in said patents.

APPLICATION OF THOMAS A. EDISON

RAILWAY SIGNALLING APPARATUS

FILED FEBRUARY 16, 1888

SERIAL No. 192,094 (EDISON'S No. 4883)

TO THE COMMISSIONER OF PATENTS,

S I R :-

In the above entitled application the following amendment is submitted:

In 1st claim, 2nd line, before "train" insert

--- combination with the line wire, of the ---

Same claim, last line after "train" insert

--- and electrical signalling apparatus connected with said train conductor ---

Repeal the 2nd claim and substitute-

--- 2. In railway inductive signalling apparatus, the combination with the line wire of the train conductor composed of a continuous flexible conducting cord or rope extending without break lengthwise of two or more cars of the train, a reel on which said train conductor is wound and electrical signalling apparatus connected with said train conductor, substantially as set forth. ---

As we understand the last Official letter, only claims 1 and 2 were objected to, and these because they were believed not to contain enough elements to make a complete combination. This objection is overcome by the above amendment and allowance is asked.

Respectfully,

Attorneys for Edison.

Dated, New York, October 12, 1888.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(2-686.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE
MAILED
NOV 15 1888

WASHINGTON, D. C., Nov. 14, 1888.

Thomas A. Edison,

Care:- Dyer and Seely,

#40 Wall St.,

New York City.

Subject: Railway Signaling Apparatus

Filed Feb. 16, 1886. No. 192,094.

Please find below a communication from the EXAMINER in charge of the application
above noted.

C. E. Mitchell

Commissioner of Patents.

Room No.91.

This case, since the amendment of the 14th ultimo, has been
considered.

The claims present nothing of patentable novelty over Smith,
#247,127, Sep. 13, 1881--R. R. Car Teleg.--in view of Mees & Sher-
man, and English patent #3521 of 1874, of record.

All that applicant has done is to substitute a cable conden-
sor for a plate condenser, which cable may be extended over ²one
or more cars. There would be no invention involved in coupling
the plate condenser (the metal roofs) of Smith, and thereby form-
ing a condenser extending over a number of cars. The reel is a
common expedient incident upon the use of the cable. Mees and
Sherman show that it is old to locate conductors upon the roofs of
cars, and the English patent shows the common use of the reel.
(over).

#192,094.

To simply substitute the flexible continuous cord or rope and its accompanying reel of the English patent, for the condensing plates of Smith, can involve no invention, and yet this substitution produces applicant's device.

Attention is also called to the fact that condensing plates or conductors of several cars have been joined to form a conductor "extending without break (when joined) lengthwise of two or more cars"; see Edison & Gilliland, #350,234, Oct. 5, 1886--R. R. Car Telog.

The claims are rejected.

THOMAS A. EDISON
RAILWAY SIGNALING APPARATUS
FILED FEBRUARY 16, 1886
SERIAL NO. 192,094.

To the Commissioner of Patents:

Sir:-

The claims in this application are rejected on several patents no one of which shows the entire invention which is clearly set forth in the claims; nor do all the patents together disclose the invention. It is therefore clear that the claims do not cover a mere aggregation of features taken from the several patents. The fact that it is old, broadly, to locate conductors on the roof of cars, and that it is old to use reels for holding conductors, does not show that there is no invention in employing a long flexible conductor extending over two or more cars in combination with the line wire with which said long flexible conductor co-operates inductively.

Applicant alleges that he has found that better effects are obtained by making the induction member on the train long and narrow than by making it of large surface by increasing the width. We submit that this is not a mere double use of the conductor on the car roof shown by Nees and Sherman.

The application was originally presented to cover a definite improvement on the patent to Smith (see page 1 of applicant's specification). The claims do not subordinate any of

the patents cited, which show certain elements of applicant's claims, or which show certain analogous devices. It seems, therefore, that the claims should be allowed, and we request that this action be taken. If the Examiner desires any change in the description or claims to make any particular feature clearer, proper amendment will be made.

Respectfully,

Attorneys for Edison.

New York, May 16, 1891

Esda No. 111
Case No. 111

(2-071 #.)

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., May 20,

T. A. Edison

Care Dyer & Seely

38 Wall St.

New York, N. Y.

Subject: Railway Signal

No. 192094

Filed Feb. 16, 1888

Filed

No.

Please find below a communication from the EXAMINER in charge of the application above noted.

Room No. 91

All communication should be addressed to:
"The Commissioner of Patents,
Washington, D. C."

C. E. Mitchell

Commissioner of Patents.

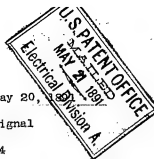
This case since the communication of the 18th instant has been reconsidered in connection with the drawing and it is found that there is one weak point in the references.

While induction between two extended surfaces is of common knowledge and induction between an extended surface and a cable or wire has been shown in the railway car telegraphs, it does not appear from the record that induction from one cable to another cable has ever been attempted. The patentability of this may well be doubted since it is a mere use of a cable for a plate, a cable being old for the purpose. A reference has, however, been found showing this feature in English patent No.

3132 of 1879, (Telegraphy). It is regretted that this was not

earlier cited. ⁶⁻⁰¹⁷ X To enable ship's shore station to communicate cable has from shore suitable distance out to sea (no drawing) ship provided with trailing cable. Signals rec'd by telephone, gal. or

Any communication respecting this application should give the serial number, date of filing, and title of invention.



In view of this patent which shows the broad idea and of the record references which show the feature of detail, the application must be again rejected.

T. A. EDISON

RAILWAY SIGNALLING APPARATUS

SERIAL NO. 192,094,

FILED February 16, 1886,

TO THE COMMISSIONER OF PATENTS,

S T R :

The claims set forth, clearly and definitely, novel and useful combinations. The references cited show certain apparatus bearing more or less resemblance to these combinations, but they do not show the same as a whole. The English patent cited in the last Office letter suggests running a cable from the shore out to sea a suitable distance, and providing ships with cables, which are dragged along behind the ships and signal from one cable to another when they are in proximity. It is suggested that the signals will be noted by suitable telephones or galvanometers. This patent is insufficient to constitute a valid reference. There is no drawing and the description amounts to mere suggestions only. No operative apparatus is described, and especially no transmitter. Moreover, it does not show the particular combinations of applicant's claims. The purpose and effect of applicant's improvements have been already pointed out, and it is urged that the claims be allowed.

Respectfully,

Attorneys for Edison.

New York, March 15, 1892.

RECEIVED
MAR 21 1886
DYE

(2-071a)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

RECEIVED
MAR 21 1886
PATENT OFFICE

WASHINGTON, D. C., March 21, 1886

T. A. Edison

Care Dyer & Seely

Washington City

Subject: Railway Signal

No. 192094

Filed Feb. 16, 1886

Filed

No.

Please find below a communication from the EXAMINER in charge of the application

Room No. 21

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

W. E. Simonds

Commissioner of Patents.

Since the communication of the 16th instant this case has been considered, and as no good reason is seen for changing the ground of the last official action the claims must be a second time rejected.

The English provisional specification cited in the last action is, particularly in view of the other references of record, a sufficient disclosure to constitute it a good reference.

The case is in condition for appeal to the Board of Examiners-in-Chief.

Any communication respecting this application should give the serial number, date sent, and title of invention.

DYER & SEELY.

RICHARD M. DYER
H. W. SEELY
D. H. DRISCOLL

LAW OFFICES, SPECIALTY PATENTS.

30 WALL STREET,

NEW YORK, Jan'y 31, 1894

Thomas A. Edison, Esq.,
Orange,
N. J.

John R. R. R.



Dear Sir,-

We send you enclosed a copy of the claims as they now stand and tracing of the drawing in your application for Railway Signaling Apparatus filed February 16, 1886. So far as we are aware, this application was never assigned by you to anyone. The claims now stand finally rejected and the case must either be appealed or abandoned.

The references are the old patent of William Wiley Smith, which you no doubt remember, which is cited as showing an induction plate on the top of a car; one of the joint patents of Edison and Gilliland, which shows the condensing surfaces of two or more cars joined together; an English patent which shows a long conductor running through several cars of the train and wound on a reel in one car and used for the purposes of signaling but not for signaling by induction; and another English patent which very vaguely describes signaling from a ship to the shore by extending cables from the shore into the sea and trailing a cable in the water from the ship which is supposed to signal through the water when near enough to the shore cables.

We think there is a good chance of success if an appeal should be taken on this case. The basis of rejection is that there is no invention in view of all these patents in what you claim, but, in our opinion, the objection is not well founded.

Will you please advise us whether you wish to do anything about the case, and whether we shall take the appeal?

Yours truly,

A handwritten signature in dark ink, appearing to be 'J. H. [unclear]', written in a cursive style.

(Enclosures)

Abandoned Patent Applications, Case 665
Telegraphy
(filed July 10, 1886)

Thomas A. Edison
of
Newellin Park N.J.

Patent

Specimen of Patent signed July 7, 1880

Filed July 20, 1880.

Revised Sept. 22, 1880.

Amended Oct. 31, 1880.

Revised Feb. 1, 1881.

Added to Office Feb. 1, 1881.

" " Feb. 1, 1881.

A. S. A. Feb. 2, 1881.

Revised March 1, 1881.

Amended Feb. 27, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

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Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

Revised March 9, 1891.

THE UNITED STATES OF AMERICA

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following be and the same are hereby enacted into law:

The object of my invention is to provide a method of telegraphy, by the use of force exerted on wires and conductors, which will be exceedingly simple and will involve the use of no current, which is simpler and more distinct in its operation and more convenient than the ordinary telegraph system. It is called an inductionless or acoustical telegraph, or a telegraph in which a telegraph is used for the purpose of transmitting a message, without the use of any current in the air space intervening between the conductors. The invention is generally applicable to the use of telegraphs. In its specific application to the use of telegraphs, the principle of current induction or that of static induction may be employed, for overcoming the resistance of the intervening air space just referred to, but I prefer to work upon the principle of static induction as illustrated in the sketch of letter 247/127. In fact the operation of the Smith patent may be employed in the carrying of the method which forms a part of this invention, although I prefer to use an apparatus differing somewhat in detail from that of the Smith patent, and more especially in this respect, that instead of the ordinary carbon or talking transmitter, I prefer to use the more sensitive musical transmitter.

My new method of tele-rashin consists in the production of Morse or other arbitrary signals preferably, in the form of a musical note at a telephone transmitter and the transmission and reproduction of the same telephonically.

While I prefer to produce such Morse or other arbitrary signals at the telephone transmitter by the human vocal organs, it is evident that they might be produced and controlled by any other suitable means.

In the accompanying drawing forming a part hereof,--

Figure 1, is a view of a station and a moving car with a diagram of instruments and connections showing the invention applied to apparatus operating upon the principle of static induction:

Figure 2, is a view principally in section of the musical transmitter:

Figure 3, a view illustrating the production and control of the Morse or other arbitrary signals by means other than the human vocal organs: and

Figure 4, a side view of the controlling key for this last form of apparatus.

With reference more particularly to figures 1 and 2; A is the station, and B is the car moving on rails C. Three line wires 1, 2, 3 are shown as employed for the line conductor. These may be the ordinary telegraph wires at the side of the track, and any number of such wires may be employed. The wires 1, 2, 3 are preferably connected with separate condensers a in the station, which condensers on their other sides are connected together, and through the transmitting and receiving apparatus to earth. The station transmitting apparatus and

the receiving apparatus are preferably located in separate wires d, e, connected alternately with the earth wire f by a switch h. For the station receiving apparatus an ordinary magneto electric telephone receiver h or other form of telephone receiver is employed. For the station transmitter, a magneto coil i is included in wire d, and this is shunted by a telephone transmitter j and a battery g, the transmitter points being in turn shunted by a condenser u to sharpen the impulses and absorb the spark. This form of induction apparatus I prefer to use at the station, although an ordinary induction coil can be used as shown on the car.

The car h is provided with a metallic roof i or other exterior surface of metal, insulated from the ground as perfectly as possible except through the instruments. The earth wire z runs to a car axle where it makes a ground connection through the car wheels and the rails upon which the car travels. A switch c serves to connect the earth wire either with wire s or wire q. These run to the metallic condenser surface i, the wire s including the secondary circuit of an induction coil k, while wire q includes a telephone receiver h'. The primary of induction coil k includes a telephone transmitter j', and a battery g', while the transmitter is shunted by a condenser u'.

The transmitters j j' are preferably musical telephones. Figure 2 illustrates a form that may be employed. The metallic diaphragm d has a platinum point e. The back point f of the telephone is a strip of platinum foil wrapped over a short section of soft rubber tubing and carried by an adjusting screw g. This is a very sensitive instrument.

The operation of the apparatus by my improved method I will now explain: The operator at the station and those upon the several trains running over the road and provided with the apparatus, will have the switches turned to throw in the receiving telephones which will be constantly held to the ear. When the station operator desires to communicate with a train, or a train with the station, or one train with another, the operator desiring to open communication will switch into circuit his transmitter and placing his mouth to the transmitter will test into it, by the use of his vocal organs, Morse, numerical or other arbitrary signals, the signals being preferably a musical note made short for dots and prolonged for dashes. These signals will be transmitted over the line conductor and will be reproduced by all the telephone receivers and heard by the operators having such receivers to their ears. The operator called up will respond by switching in his transmitter and replying in a similar manner, and the communication will then proceed in a manner similar to regular telegraphing, with the exception that the Morse or other arbitrary signals will be produced at a telephone transmitter by the vocal organs and will be transmitted and reproduced telephonically.

The transmission of the signals back and forth between the line conductor and the car across the air space by induction will be understood.

It is evident as before stated that the Morse or other arbitrary signals may be produced and controlled by means other than the human vocal organs. An illustration of an example of such a modified form of apparatus is given in figures 3 and 4, although it is apparent that many different

devices for producing and controlling the arbitrary signals could be employed.

The telephone transmitter (preferably a musical telephone) L has, in place of a mouth piece, a pipe h terminating in a musical reed i located in front of the transmitter diaphragm. From pipe h extends a flexible tube k to an air reservoir m. This reservoir may be supplied with compressed air in any of the well known ways. At a point in the tube k a key n acting as a pinch-cock closes the tube normally, while by depressing the key the compressed air will be allowed to pass to the reed in front of the transmitter diaphragm. By working the key Morse or other arbitrary signals can be produced at the transmitter, and the effect will be the same as if such signals were produced by the human voice.

The transmitter L and the connecting devices may be used in place of the transmitter " or ".

WHAT I CLAIM IS:-

FIRST: The method of telegraphing described, consisting in producing Morse or other arbitrary ^{by sound waves} telegraphic signals at a telephone transmitter, and transmitting and reproducing such signals telephonically, substantially as set forth.

SECOND: The method of telegraphing described, consisting in producing Morse or other arbitrary ^{by sound waves} telegraphic signals in the form of a musical note at a telephone transmitter, and transmitting and reproducing such signals telephonically, substantially as set forth.

THIRD: The method of telegraphing in railway induction telegraphs wherein connection is maintained with a moving car by induction, which method consists in producing Morse or

6
other arbitrary telegraphic signals at a telephone transmitter, and transmitting and reproducing such signals telephonically, substantially as set forth.

FOURTH: In telegraphs, the combination with signal receiving apparatus, of a musical telephone transmitter for transmitting Morse or other arbitrary signals, substantially as set forth.

FIFTH: In telegraphs, the combination with signal receiving apparatus, of a musical telephone transmitter for transmitting Morse or other arbitrary signals, and a condenser shunting the points of the musical transmitter, substantially as set forth.

SIXTH: In telegraphs, the combination with a receiving telephone, of an induction coil, a musical telephone transmitter for transmitting Morse or other arbitrary signals, and a condenser shunting the points of the musical transmitter, substantially as set forth.

SEVENTH: In ^{an} railway induction telegraph, the combination with a ^{new} station, a line conductor and a ^{trans-} ^{car} moving car ^{station} of a musical telephone transmitter for transmitting Morse or other arbitrary signals, and a telephone receiver, ^{and} ^{"being in a battery circuit"} ^{with the latter station} ^{substantially as set forth.}

EIGHTH: In telegraphs, the combination with a telephone transmitter, of a mechanical sound producing device producing Morse or other arbitrary signals at such transmitter, substantially as set forth.

NINTH: In telegraphs, the combination with a musical telephone transmitter, ^{in a battery circuit} of a mechanical sound producing device ^{acting on electrodes in a battery circuit} producing Morse or other arbitrary signals at such transmitter, substantially as set forth.

TENTH: In telegraphs, the combination with a telephonic transmitter, of a mechanical sound producing device producing Morse or other arbitrary signals at such transmitter, and a key for controlling such device, substantially as set forth.

665 Abandoned

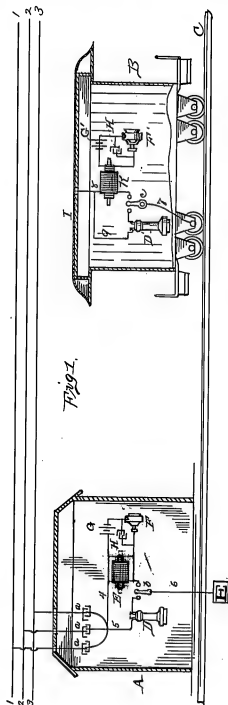


Fig. 1.

ATTEST
E. H. Perkins

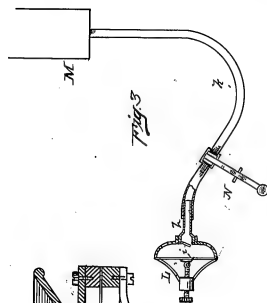


Fig. 2

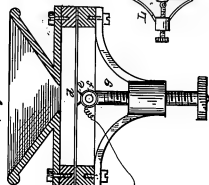


Fig. 3



INVENTOR:

Traced June 22nd 1886
E. H. Perkins

(2-020.)

Room No. 20.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

{ SERIES OF 1880.

No. 257637

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D. C., July 10, 1886

SIR:

I have to acknowledge the receipt of the petition, specification, and drawing of your
alleged improvement in

Telegraphy

with Fifteen Dollars as the first fee payable thereon.

The papers are duly filed, and your application for a patent will be taken up for
examination in its order.

You will be duly advised of the examination.

Very respectfully,

M. W. Montgomery

Commissioner of Patents.

Thomas A. Edison

By *Exer. Secy* 65-5- Ave N.Y.C.

NOTE.—In order to constitute an application for a patent, the inventor is by law required to furnish his petition, specification, oath, and drawings (where the nature of the case admits of drawings,) and to pay the required fee.

No application is considered as complete, nor can any official action be had thereon, until all its parts, as here specified, are furnished in due form by the inventor or applicant.

(257-20,000)

Any communication respecting this application should give the serial number, date of filing, and title of invention.

(2-071 a.)

Room No.91...
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D. C., September 22, 1886.

A. Edison,

Care Dyer and Seely,

New York City,

Please find below a communication from the EXAMINER in charge of your application

No.207,637... for a Patent for Improvement in Telegraphy,

Filed July 10, 1886.

Very respectfully,

W. M. Montgomery

Commissioner of Patents.

(151-10 X)

No patentable method is believed to be involved in this case and the claims relating thereto are objectionable in the case.

The special use to which applicant intends putting the system shown in the patent to Smith, 247 127, Sept. 13, 1881, "R. R' Car Telegraphs", is not patentable, nor is the manner in which he contemplates vibrating the diaphragm. The use of a telephone system for

Any communication respecting this application should give the serial number, date of filing, and title of invention.

a transmitting and receiving telegraphic signals is old and well known
See patents to Brown, 238,212, March 1,1881, 'Telephones, Magnetic',
and Brown, 324, 746, August 18,1885, 'Circuits and Systems', and its
application in the Smith system of telephony is not thought to in-
volve invention. If there is any patentable novelty in the con-
struction in this, it should be brought out in the claims, and when
all formal questions have been settled action on the merits will be
taken.

Thomas A. Edison.

Telegraphy.

Filed July 10th, 1880.

Serial No. 807,637.

Commissioner of Patents,

Sir:-

In the above case we submit the following:

In 1st claim insert after "signals" in 2nd line the words --- by sound waves ---

In 2nd claim insert after "signals" in 2nd line the words --- by sound waves ----

In 3rd claim insert after "signals" in 4th line the words --- by sound waves ----

This amendment to the method claims makes the distinction over Brown clear. A new and useful method although it may be capable of being carried out by old apparatus may be patentable. As a legal proposition this has been frequently asserted by the Courts and the Patent Office.

The apparatus claims (4 to 10) are clearly distinguishable from the references.

Respectfully,

Atty's for Edison.

New York, December 31st, 1880.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(2-688.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE,
MAILED.
FEB 2 1887

WASHINGTON, D. C., FEB. 1, 1887.

T. A. Edison, Application for patent for Telegraphy.....
Care Dyer and Seely,
N. Y. City.
Filed July 10. 1886. No. 207, 637.

Please find below a communication from the Examiner in charge of the application
above noted.

M. W. Montgomery

Commissioner of Patents.

Room No. 91.

(2113-22 31.)

The objection urged in last Office letter regarding the alleged invention in this case is insisted upon and the case is objectionable for lack of novelty. No new result is brought out by applicant's manner of using the apparatus shown in the patent to Smith of record.

Thomas A. Edison,

Telegraphy,

Filed July 10th, 1880.

Serial No. 207,637, (Edison No. 685)

Hon. Commissioner of Patents,

Sir:-

It is not understood that the Examiner intends to reject all the claims, including those directed to the specific apparatus, on the general ground of lack of novelty taken by him in his last letter. He is requested to state which claims are intended to be rejected, and the specific reasons with respect to each claim.

Respectfully,

Att'ys for Edison.

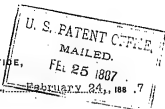
New York, February 14th, 1887.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(2-1095.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.



T. A. Edison,

Care Dyer & Seely,

N. Y. City.

Application for patent for Telegraphy.

Filed July 10, 1886. No. 207,537

Please find below a communication from the Examiner in charge of the application above noted.

A large, stylized handwritten signature in dark ink, reading "M. W. Montgomery".

Commissioner of Patents.

Room No. 91.

(7012-20 M.)

Claims 1, 2, 3, 4 & 7 are met by patent to Smith, of record.

Claims 5 & 6 are met by patent to Lockwood 281,895 July 24, 1883, "Telephones, Electric".

Claims 8, 9 and 10, are met by English patent 2909 of 1877. These references are cited as meeting the terms of the claims presented, the method in the case is not believed to be a patentable one in view of the Smith patent cited above.

APPLICATION OF THOMAS A. EDISON

TELEGRAPHY

FILED JULY 10, 1886

SERIAL NUMBER 207,637 (EDISON'S No. 665)

TO THE COMMISSIONER OF PATENTS,

S I R : -

It is not understood what bearing the patent to Smith cited, has on the method claims in this case. It certainly has no more to do with the first claim than any telephone line, and it is submitted that there can be no doubt that applicant has invented something over the ordinary use of telephones. It appears from the record, that applicant was the first to transmit intelligence by producing arbitrary signals by sound waves at a telephone transmitter and reproducing them in the form of sound at a telephone receiver. This is the method which applicant claims, and there is no reference to such a method in the Smith patent. Smith's only idea was to use his telephones in the ordinary way by transmitting and receiving articulate speech. It is not seen how the fact that Smith's invention was for railway train telegraphy and applicant describes this as one of the uses of his invention, makes Smith a good reference. Even if applicant used Smith's precise apparatus, he would be entitled to a patent for his new method of operation, it being well established both in the Courts and in the Patent Office, that a new method even if it is carried out by old apparatus, may be a patentable invention. If the general method set forth

in the first claim is patentable so is the specific use of such method by induction as specified in other claims.

Smith has no musical telephone transmitter as claimed in the 4th claim. Neither has Lockwood cited against the 5th and 6th claims both of which include this element. The English patent cited does not seem to contain the specific combinations of the 8th, 9th, and 10th claims.

Reconsideration of the last Official action is asked.

Respectfully,

Attorneys for Edison,

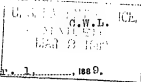
DATED, New York, February 21st, 1889.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(3-000.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., May 1, 1889.



T. A. Edison,

Care:-Dyer and Seely,

#65 5th. Ave.,

New York City.

Application for patent for Telegraphy.

Filed July 10, 1886. No. 207,637.

*Please find below a communication from the Examiner in charge of the application
above noted.*

Benton J. Hall

Commissioner of Patents.

Room No. 21.

(3 8-081)

-----00000-----

The claims in this case are finally rejected upon the references of record, and are now appealable to the Board of Examiners-in-Chief.

APPLICATION OF THOMAS A. EDISON

TELEGRAPHY

SERIAL NO. 207,637

FILED JULY 10, 1896

TO THE COMMISSIONER OF PATENTS,

S I R :-

Please amend this application as follows:

Trace all the claims and insert the following

claims -----

1. The method of transmitting signals electrically which consists in breaking a current into impulses corresponding to Morse signals by projecting sound waves corresponding to the signals to be transmitted against a diaphragm controlling electrodes in a circuit, communicating said impulses to a line, and receiving the same in a suitable receiver, substantially as described.

2. The method of transmitting signals electrically which consists in breaking a current into impulses corresponding to Morse signals by projecting sound waves corresponding to the signals to be transmitted against a diaphragm controlling electrodes in a circuit, communicating said impulses to a line inductively, and receiving the same in a suitable receiver, substantially as described.

3. The method of transmitting signals electrically which consists in breaking a current into impulses corresponding to Morse signals by projecting sound waves corresponding to the signals to be transmitted against a diaphragm controlling electrodes in a circuit, communicating

said impulses to a line, and receiving the same inductively in a suitable receiver, substantially as described.

4. In an induction telegraph system, the combination with a receiving station, a line conductor and a transmitting station or ear, of a musical telephone transmitter at the latter station for transmitting Morse or other arbitrary signals, said musical telephone being in and controlling a battery circuit, and a telephone receiver suitably connected to the line conductor, substantially as described.

5. The combination with a musical telephone transmitter in a battery circuit, of a mechanical sound producing device producing Morse or other arbitrary signals at such transmitter and acting on electrodes in said battery circuit, substantially as described. -----

The patents to Brown cited show merely devices commonly known as reed or magneto telegraph instruments, the signals being received by means of telephones. The signals are not sent by the effect of sound waves on a musical telephone, but by the vibration of reeds or diaphragms adjacent to a magnet, thereby generating currents corresponding to the reed vibrations. The present claims 1, 2 and 3 each indicate that the sound waves corresponding to Morse signals operate on electrodes in a battery circuit to produce the signals. Claims 2 and 3 have in addition the feature of inductive connection between the transmitter or receiver and a line. Claims 4 and 5 include the musical telephone for the Morse signals in a battery circuit, claim 5 including also the mechanical sound producing device.

Before the claims insert ----- It will be

clear that the method above described differs radically from the method of transmitting Morse signals by mechanically causing reeds to vibrate before a magnet of a magneto telephone to induce currents which affect a distant receiver.---

Favorable reconsideration of the application as amended is requested.

Respectfully,

Attorney for Edison.

New York, February 27, 1891.

DEPARTMENT OF THE INTERIOR,
 UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

March 9, 1891

T. A. Edison

Care Dyer & Seely

65 Fifth Ave.

New York, N. Y.

Subject:

Telegraphy

No. 207637

Filed July 10, 1886

Filed

No.

Please find below a communication from the EXAMINER in charge of this communication
 above noted.

Room No. 91

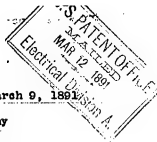
All communications should be addressed to
 "The Commissioner of Patents,
 Washington, D. C."



Commissioner of Patents.

The proposed amendment filed in this case has not been entered because it is in no sense an answer to the last official action. The claims were finally rejected on March 1, 1889, and applicant was informed that they were appealable to the Board of Examiners-in-Chief; in answer to this he waits two years to a day and comes back to the Office with a request for reconsideration, substituting for the claims rejected other claims covering exactly the same subject-matter.

The Examiner is willing to consider any case which has been finally rejected by his predecessor or even by himself, if the applicant considers that there is good reason to expect a change of opinion in regard to it. In such cases, the final rejection will either be allowed to stand of its original date,



Any communication respecting this application should give the serial number, date of filing, and title of invention.

compelling applicant to appeal or abandon his case as the Rules require, or else the second rejection will be withdrawn and the proper action taken. But such request must be made say a month before the two years run out so that the Examiner's action may reach the applicant and he may make responsive action within the two years in case the final rejection is not withdrawn. In this case for instance, the application was abandoned before the Examiner had time to consider it. But had he considered it, he would have allowed the second rejection to stand and forced applicant to take his appeal, as he sees no novelty in the application.

Abandoned Patent Applications, Case 674
Telegraphs
(filed July 16, 1886)

Serial No. 208,360.

Thomas A. Edison
of

New York, N.Y.

Telegraphs.

Spec. signed July 15th 1886.

Cart. " " 16th 1886.

Filed July 19th 1886.

Replied Sept. 22nd 1886.

Amended Sept. 24/86

Replied Sept. 29/86

Amended Sept. 2/90

Replied Sept. 9/90

Amended Sept. 6/92.

Replied Sept. 17/92.

Warden

For the Prison

Forwarded July 17/86.

674

Improvement in *Telegraph*

My invention relates to the ^{phonoplex} telegraph which is covered in principle by my patent No. 333,289.

My object is to produce such an improvement in the ^{phonoplex} telegraph apparatus that the diaphragm receivers or sounders will not respond at all or with full effect to the signal impulses produced by the transmitter of their own sets. I have found by practice that the diaphragm receivers or sounders respond so loudly to the signals transmitted from their own sets that the noise is confusing to operators at adjoining tables, and hence some provision for stopping or reducing the noise becomes desirable. A further object is to provide means for cutting out the transmitting battery at each ^{phonoplex} set, except when in use for transmitting signals, and also preferable for removing from the line the resistance of the magnetic coil or other induction element. A further object is to sharpen the ^{phonoplex} impulses.

In the accompanying drawing, forming a part hereof,

Figure 1, is a view principally in diagram illustrating the preferred apparatus embodying the several features of invention:

Figure 2, a top view of the transmitting key used as a part of this preferred apparatus:

Figure 3, a view principally in diagram of a modified form of apparatus; and Figure 4, a view of a modified form of device for silencing the diaphragm sounder.

The ^{phonoplex} apparatus as will be understood is designed for use upon lines having the ordinary Morse sets. The signalling key *a* and relay *b* of such a set are shown in Figure 1 as included in the line L L. This line also has the usual main battery *m b* for operating the ordinary Morse sets.

and the keys and relays of such sets are shunted by condensers

c.

Each ^{phonoplex} set upon the line includes a diaphragm receiver or sounder A located in the line, which receiver or sounder is similar to a magneto-electric or other form of telephone receiver. For transmitting signals each ^{phonoplex} set has a magnetic coil B or other induction element, included in the line, through which the induced phonoplex impulses are thrown upon the line. Two or more of such coils B may be employed as shown in figure 3. To charge the transmitted impulses, a condenser C is located in a shunt around the one or more magnetic coils or other induction element employed, this device being one of the features of my present invention.

The ^{phonoplex} transmitting circuit is a local shunt ^{battery} 1, 2 around the magnetic coil or coils B, through the local 1, 2, the armature lever D and the front and back spring points d of this armature lever. The lever D is operated by a magnet E, forming therewith a circuit controlling sounder. This magnet E is controlled by a key F and local battery 1.

By manipulating the key F, the sounder will be caused to open and close the transmitter circuit 1, 2, and the discharge of coil or coils B at each opening of the circuit will produce a signal impulse upon the line. To vary alternate signals a resistance R is included in circuit with the back points d.

To silence the diaphragm receiver or sounder A for outgoing signals, a shunt circuit 3, 4, is ^{preferably} formed around it. This extends to a point f and spring g. When the armature

lever D is at rest an insulated arm or block g on such arrangement lever presses on the spring g moving it off the point f and opening the shunt. The point f however is so closely adjusted to the spring g that when lever D moves to transmit signals the spring g will touch the contact f, before the lever D leaves its back contact, and hence the shunt g, f, will be closed and the diaphragm sounder thrown out of circuit before the magnetic coil discharges, to produce the first signal impulse. It will be seen that the diaphragm sounder will thus be shunted at each discharge of the magnetic coil or coils, and will not respond to outgoing ~~transmitting~~ signals, while such shunt will always be open when the transmitting sounder is at rest on its back point. Instead of cutting the diaphragm sounder out of circuit by closing a shunt around it, its circuit may be opened entirely and the line circuit closed. This may be done as shown in figure 2 by providing the lever D with an insulated contact g closing the line circuit at spring f at the same time that it opens the circuit of the diaphragm sounder at the contact u.

For throwing the ~~transmitting~~ battery L, B into and out of the transmitter circuit 1, 2, and for cutting out the magnetic coil or coils B, I prefer to use a two point hand switch G as shown in figure 1 and 2. The circuit 1, 2, is divided into two branches b and c leading to the open points h i of the switch. The branch b includes the battery L, B while the branch c is a simple short circuit. When switch G is on the point h the battery L, B is in circuit; when the switch G is on the point i the magnetic coil B is shunted or short-circuited. This switch G is preferably constructed as shown in figure 2. The key P is mounted upon a base frame f as usual upon which is also pivoted the switch G. This switch has two arms k l extending from its pivot and approximating the shape of the letter Y. The two points h i are insulated contacts mounted upon the base f. In one position of the switch, that for receiving, the arm l is in contact

with point i as shown in figure 2. The opposite position of the switch brings the arm k into contact with the point h. This double hand switch is operated in the same manner as the simple switch at present used on Morse signalling keys for telegraphing: hence no special instruction of a telegraph operator is required.

As a substitute for or an addition to this hand switch G, I may employ an automatic switch for cutting out the battery F. Such a device is shown in figure 3.

The back end of armature lever a inclines the stem n of a dash ~~nut~~ n, a nut n on the stem permitting the proper adjustment. Two overlapping springs o o are arranged above the point of the stem in such a way that the circuit 1, 2 which passes through such springs is normally open.

When the lever a is moved to transmit signals, it lifts the stem n and dash pot plunger and forces springs o o together closing the circuit 1, 2 before such lever a leaves its back point. The lever a which plays freely on the stem n below the nut n moves back and forth on such stem striking the nut n at each forward movement and keeping the dash pot plunger elevated and the circuit 1, 2, closed. When transmitting is stopped even for a moment, the dash pot plunger will fall and the circuit 1, 2 will be opened.

WHAT I CLAIM IS:-

FIRST: In phenalex telegraphs, the combination with the receiving diaphragm sounder, of ~~means~~ ^{means} for cutting it out of circuit in transmitting, substantially as set forth.

SECOND: In phenalex telegraphs, the combination with the receiving diaphragm sounder, of an automatically ^{active} ~~circuit~~

cls 1-6, 8, 9
Amalgamated Telegraph Co.
25 So. 7th St., St. Louis, Mo.
10460
28104470
45064505
you are being
VX 15, No 62

closer or thinner
shunt for cutting it out of circuit in transmitting, substantially as set forth.

THIRD: In *induction* ~~phonoplex~~ telegraphs, the combination with a receiving diaphragm sounder and a transmitting circuit controlling sounder, of ~~connections for cutting out of circuit~~ *circuit connections for cutting out of circuit* contact points at which said ~~connections are made~~ *circuit connections are made* controlled by said transmitting sounder, substantially as set forth.

FOURTH: In *induction* ~~phonoplex~~ telegraphs, the combination with a transmitting induction element, of a local transmitter circuit including a battery and a switch for closing the circuit of such battery, when not in use for transmitting, substantially as set forth.

FIFTH: In *induction* ~~phonoplex~~ telegraphs, the combination with a diaphragm ~~receiver and a~~ *receiver and a* transmitting induction element, located in the line of a ~~circuit~~ *controlled by the transmitter* switch for cutting such induction element out of the line circuit when not in use for transmitting, substantially as set forth.

SIXTH: In *induction* ~~phonoplex~~ telegraphs, the combination with a transmitting induction element located in the line, a local transmitter circuit including a local battery, and a two point switch closing the battery circuit at one point and shunting the induction element at the other point, substantially as set forth.

SEVENTH: The telegraph key F in combination with the two point switch G mounted upon the base of the key, substantially as set forth.

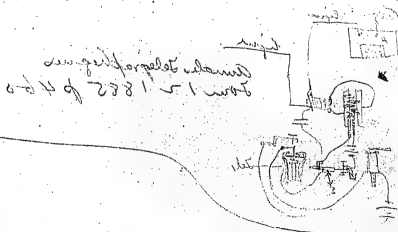
EIGHTH: In *induction* ~~phonoplex~~ telegraphs, the combination with the local transmitter circuit including a local battery, of the transmitting sounder and a switch for keeping the battery

EP 4350170/30
Abraham 35499-2-186

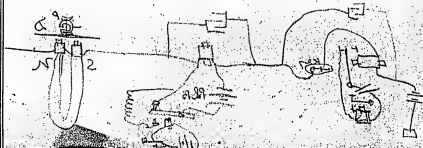
circuit normally open, such switch being controlled automatically by said transmitting sounder, substantially as set forth.

WITNESSES: In phonotelex telegraphs, the combination with the transmitting induction element, of a condenser shunting the ~~same~~ to sharpen the impulses, substantially as set forth.

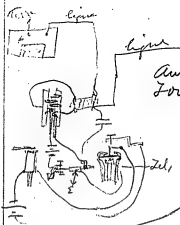
induction element



Re Receiver Jan 20 1882

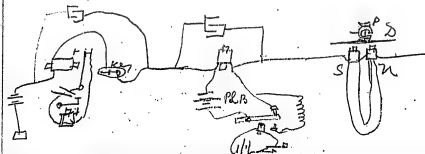


10-11-1964



Annales Telegraphiques
Tome 12. 1885 p 460

La Lumiere du 20 p 320



-674-

Adm. Sec.

Fig. 1.

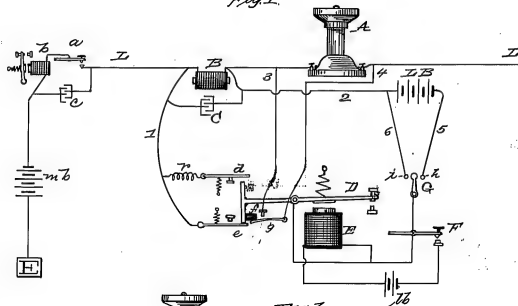


Fig. 3.

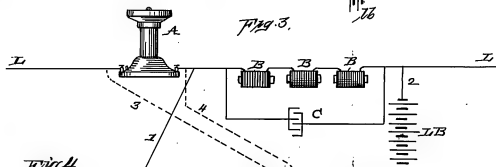


Fig. 4.

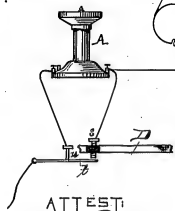
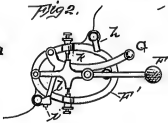


Fig. 2.



ATTEST

Ed. Howard

INVENTOR:

Traced June 29rd 1886
EBR

(2-020.)

Room No. 26.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

{ SERIES OF 1880.
No. 201360

DEPARTMENT OF THE INTERIOR,

en 674

United States Patent Office,

Washington, D. C., July 19, 1886

SIR:

I have to acknowledge the receipt of the petition, specification, and drawing of your
alleged improvement in Telegraphs

with Fifteen Dollars as the first fee payable thereon.

The papers are duly filed, and your application for a patent will be taken up for
examination in its order.

You will be duly advised of the examination.

Very respectfully,

W. M. Montgomery

Commissioner of Patents.

T. A. Edison
care Bryant & Ledy
40 Maiden Lane

Any communication respecting this application should give the serial number, date of filing, and title of invention.

NOTE.—In order to constitute an application for a patent, the inventor is by law required to furnish his petition, specification, oath, and drawings, (where the nature of the case admits of drawings,) and to pay the required fee.

No application is considered as complete, nor can any official action be had thereon, until all its parts, as here specified, are furnished in due form by the inventor or applicant.

(207-33,301)

(2-071 a.)

SEP 23 1886

Room No. 91
All communications should be addressed to
The Commissioner of Patents,
Washington, D. C.

DEPARTMENT OF THE INTERIOR,

United States Patent Office

Washington, D. C., September 22, 1886.

T. A. Edison,

Cate, Dyer and Seely,

New York City.

Please find below a communication from the EXAMINER in charge of your application

No. 208,360, for a Patent for Improvement in Telegraph,

filed July 16, 1886.

Very respectfully,

M. R. Montgomery
Commissioner of Patents

The use of the term 'phonoplex' in this case is objectionable, because indefinite and not understood in the art.

Reference letters H, & H, are not found on the drawing.

The first five claims in this case cover subject matter shown in English patents 1044 of 1870, & 4506 of 1885, and also in an article in the Journal of the Society of Telegraph Engineers and

Any communication respecting this application should give the serial number, date of filing, and title of invention.

(1004-10 M.)

Electricians, vol, 15, No 62, page 305, et seq.

Claim 7 covers simply the conjunction of the parts shown at the transmitting station in figure 10 of English patent 4850 of 1880 on a single base and is believed to involve no patentable invention.

The subject matter of claim 9 is shown in English patent 1044 of 1870.

RECEIVED
DEC 11 1938
U.S. DEPT. OF COMMERCE
BUREAU OF PATENTS

DEC 11 1938

RECEIVED FOR REPRODUCTION

DEC 11 1938

RECEIVED

THOMAS A. EDISON

TELEGRAPHS

FILED JULY 10TH 1886

SERIAL NO. 208860 (Edison's No. 674)

To the Commissioner of Patents,

S I R:-

In the above case we submit the following:

The drawing has been corrected as requested.

Erase the word "phonoplex" where it occurs in line 8 page 2, and line 20 page 2.

Substitute - induction - for "phonoplex" at the following points: page 1 lines 1, 4, 13, 16 & 26; page 2 lines 3, 7 & 15; page 3 line 11, and in the first line of each of the claims.

In claim 9 insert after word "element" in second line the words ^{and} - receiving diaphragm sounder -

With regard to the references, it is submitted that none of the references describe the same character of telegraph apparatus as that described by this application, or one having the same capacity or adapted to the same use. The diaphragm sounder which is an element of most of the claims is wanting in the references and also the peculiar character of induction transmitter.

Claim 7 covers a telegraph key having a double switch upon the same base which is constructed so that the ordinary movements to which Morse operators are accustomed will operate the switch, and hence no special instruction of

the operator will be required. This is thought gives the character of invention to the matter covered by the claim.

A re-examination is therefore requested of the entire case.

Respectfully,

Attorneys for Edison.

New York, September 21st, 1888.

(2-086.)

C.W.I.

M. A. LUGER

D. WASHINGTON, D. C., Sept. 29, 1888.

Application for patent for "Telegraphy."

Filed July 19, 1886. No. 208,360.

No. 208,360.

Filed July 19, 1886.

Benton J. Hall

Commissioner of Patents.

(p 6-051)

Room No. 91.....
(p 6-201)
Reference lett

Patent to Absterdam, #354,996, Dec. 28, 1886--Circuits and
 oms--is cited additionally for claim 7.

The amendment to claim 9 renders it indefinite; attention is called to the "La Lumiere Electrique", May 18, 1886, pg. 320, which

The amount to claim is indefinite; attention is called to the "La Lumiere Electrique", May 18, 1888, pg. 280, which

2. The following information is being furnished to you for your information:

Patent to Apartment, #324, 288, Dec. 28, 1888--Circular, and

broader to ensure

Tome XII, 1885, pp. 480, which is cited in addition to the refer-

*** * ***

POSTALIZACIJA NA NO BEFOBOY OVA E BNA 8 BNA ,8 OF I KODIR

used to indicate the battery contacts on the key board.

block on the drawing, as is stated at the top of page 3, but it

Refer and letter, h, does not indicate the "insulated arm of

...19... Имя твое

1997-1998

• vt 1. to 2. well

SECRET

Garco: - Dyer & Gentry

T. A. Jones

shows the subject-matter of claim 9, and is cited additionally as prior art.
the references for this claim.

1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 25

.088,805.

..I.W.D

THOMAS A. EDISON

TELEGRAPHS

SERIAL NO. 208,360

FILED JULY 19, 1886

TO THE COMMISSIONER OF PATENTS,

G I R :-

Phrase claims 1, 2, 4 and 7, and insert the following claims -----

1. In an induction telegraph system, the combination of a receiving diaphragm sounder, a normally open shunt therefor, a circuit controller in the shunt, an induction transmitter, and a device moved by the transmitter to operate the circuit controller, closing the shunt to the sounder before ^{the} induction impulses ~~are~~ sent to line, substantially as described.

2. In an induction telegraph system, the combination of a receiving diaphragm sounder, a circuit controller and circuit connections for cutting said sounder out of circuit, and an induction transmitter, said circuit controller being moved by the transmitter to cut out the sounder before the induced impulses are sent to line, substantially as described.

4. In an induction telegraph system, the combination of an induction ~~element~~ transmitter, consisting of an induction element in the main line and a local circuit containing a battery operatively connected to the induction element, and a switch in the local circuit for cutting out

the battery when not transmitting, substantially as described

7. The combination ^{with the same battery, circuit induction, transmitter,} of the telegraph key, a base therefor, a switch lever mounted thereon, and two circuit ^{contacts & opposite terminals of the local battery.} terminals forming contacts for said lever in its forward and retracted position respectively, substantially as described: -----

Claims 3, 6 and 8 appear to us to cover combinations which are new so far as appears from the references and patentable. We therefore request a favorable reconsideration thereof.

Amend claim 5 by inserting after "switch" line 3, the words ----- controlled by the transmitter ----

Amend claim 9 by erasing "same" in the last line, and substituting ----- induction element -----

Respectfully,

Attorneys for Edison.

New York, September 2, 1890.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE
WASHINGTON, D. C.

U.S. PATENT OFFICE
SEP 19 1880
Electrical Division A

Subject: Telegraphs
No. 208360

Filed July 19, 1886

Filed

No.

T. A. Edison
Office letter of Sept. 29,
Care Dyer and Seely
36 Wall Street
New York City

Please find below a communication from the EXAMINER in charge of the application
above noted.

C. E. Mitchell

Commissioner of Patents.

Room No. 91

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

No attention has been paid to an objection raised by the
Office, and repeated in last Office letter, to the effect that ref-
erence letter h is referred to as indicating one element on the
drawing, when it indicates another. Applicant should fully as-
sage to have the description in the case accurate as the Examiner,
and he is again requested to correct this inaccuracy.

Claims 1, 2, 3, 4, 5, 6, and 8, are fully met by English
patents No. 1044 of 1870, and No. 4506 of 1885, and the description
in the Journal of the Society of Telegraph Engineers, referred to
in Office letter of Sept. 22, 1886, and are rejected. These ref-
erences show full equivalents for all the elements recited in the
claims, operate in the same manner, and produce the same result.

Claim 7 is rejected on patent to Bazby No. 215093, May
6, 1878--Switches--in addition to the other references of record
showing the construction now claimed and cited for similar claims
before in this case.

No. 208360

5.7.1. 2

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

Claim 9 is rejected on a description and illustration in

La Lumiere Electrique, referred to in Office letter of Sept. 29,
1886.

Care:- Dyer & Seely.

40--Wall St.,

New York City.

Filed July 19, 1886.

309,300.

T. A. EDISON

TELEGRAPHS

FILED JULY 19, 1886

SERIAL NO. 208,360

TO THE COMMISSIONER OF PATENTS,

S I R :-

On figure 1 of the drawing place the reference letter f' to indicate the insulating block shown immediately above the adjacent ends of springs a. f.

On page 3, line 1 of the specification change h to f'.

Amend claim 7 by inserting before "of" line 1 -----
with the local battery circuit and induction transmitter,-----

Same claim, line 3, before "forming" insert -----
connected to opposite terminals of the local battery and -----

A reconsideration of this application is requested.
The Office letter indicates that the references show "equivalents" for the elements recited in the claims. It is not admitted that the combinations shown in the references are substantially the same as those covered in applicant's claims. Applicant has made special improvements in one particular branch of telegraphy and should, it is believed, be allowed the claims presented. The arrangement of a diaphragm sounder in the manner indicated in several of the claims appears to be specifically new and of sufficient importance to render the claims patentable.

Respectfully,

Attorneys for Edison.

New York, September 6, 1892.



(S-071 a.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,



WASHINGTON, D. C., September 17, 1892.

T. A. Edison,

c/o Dyer & Seely,

40 Wall Street,

New York, N.Y.

Subject:

Telegraphs.

Filed July 19, 1886. No. 208,360.

Please find below a communication from the EXAMINER in charge of the application above noted.

Room No. 21.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

W. E. Simonds
Commissioner of Patents.

Claims 1, 2, 3, 4, 5, 6, 8 and 9 are finally rejected on the record. These claims are readable term for term on the references cited for them and are clearly met.

Any communication respecting this application should give the serial number, date of filing, and title of invention.

1. In a telegraph of Sept. 22, 1886, and are rejected. These re-
ferred to for all the elements related in the
operated in the same manner and produce the same results.
Claims 1, 2, 3, 4, 5, 6, 8 and 9 are rejected on patent to Smith No. 215,093. May
6, 1886. It is added to the other references of record
that the invention now claimed and cited for similar claim

7.7 51/2/54

messrs. Messrs. & Co.

In the prospectus and I have the pleasure
announced articles cited by the Patent Office in the
following publications, which are all that
are accessible until the Patent Library opens —
Journal of the Society of Telegraph Engineers
and Electricians.

La Lumière Electrique.

Also W. S. J. presents to Bregby and Chardham
the great difference between the Edison phone
plex system of telegraphy and the telegraph
system described by Carlew in Journal of
Telegraph Engineers and Electricians in this
in the former but one impulse is sent to
line by the induction element for each
character of a signal while in the latter many
impulses are sent to line for each signal.
In his first experiments Carlew used a
Morse key and a telephone which was the
receiving instrument — no induction element.
But he found there was almost perfect
difficulty in reading "due to the almost
perfect similarity of the make and break
clicks in the telephone." He did not know
any method to overcome this difficulty.
Later he used a vibrating transmitter dis-
charging into line at the break at each

vibration. He makes no mention of using an induction element to send the line a single impulse for each character of a signal.

The difference in the method of operation of the two systems necessitates the use of dissimilar apparatus. Carlew's vibrator is located in the line and corresponds to Edison's induction element except that the latter does not have a rotating attachment. Carlew has nothing corresponding to the Edison induction thermometer, which makes and breaks the circuit ^{through} ~~through~~ induction element and battery, varies the resistance in the circuit and short-circuits the diaphragm receiver and also the induction element at proper times. In the Carlew arrangement the battery makes and breaks circuit through battery and vibrator but circuit is also broken at vibrator. Carlew uses a simple telephone as the receiver instead of the improved diaphragm receiver. He provides a means of short-circuiting the receiver, but it is operated by hand and not automatically "moved by an induction transmitter". He makes his vibrator to operate as nearly as possible, whereas it is possible to read the outgoing mes-

age from the phonoplex induction trans-
mitter (at least I presume this is the
case.)

(Circuit does not show the arrangement of
simultaneous the Morse instruments by con-
densers, & not of placing a condenser in shunt around the
inducting element.)
U. S. Patent 215,093 Bayley

There is but one Y shaped lever in the
phonoplex key, while in the Bayley instrument
there must be at least two. The levers in
the Bayley instrument are at the back,
the levers in the phonoplex key project to
the front, and may be handled in the
same manner as the ordinary for telegraph
key switch the current in the phono-
plex ~~key~~ instrument traverses the base, where
as in the Bayley instrument, the currents
are insulated from the base.

The object of the Bayley ^{switch} instrument is to con-
nect into or shunt out of certain circuits
the contact points of the telegraph key.

The object of the phonoplex switch is to
connect into or shunt out of circuit
a battery. The contact points of the phono-
plex key are never in the circuit con-
trolled by the switch and the contact
points of the transmitter which is
operated by the key are always in ^{such} cir-

and the Phonoplex Key is in use as a part of a system of telegraphy well known at the time of the invention of the Bughby instrument.

It is Patent 354,896 - Telegraphic Switch -
John Abscrolan.

This instrument does not seem to show any great similarity to the Phonoplex Key and Switch either in construction or use.

Claim 9 seems to be fully met by article in La Lumiere Electrique.

The following citations are set to be looked up:-

English Patent #1044 of 1870

4506 " 1885

4850 " 1880

Annales Telegraphiques, 3rd Series,
Tome XII, 1885, p. 460.

G.C.S.

Citations by Patent Office.

The first five claims (also 6 and 8)
cover subject matter shown in Eng-
lish patents 1044 of 1870

4506 .. 1885

and also in an article in

✓ Journal of the Society of Telegraph
Engineers and Electricians Vol. 15, No.
62, p. 305 et seq.

The subject matter of Claim 9 is shown
in English patent 1044 of 1870.

Claim 7 covers the combination of the
parts shown at a transmitting station
in Fig. 10 of English patent 4850
of 1880 on a single base and
is believed to involve no patent-
able invention

✓ Claim 7 is rejected on patent to Bingley
No. 215, 093, May 6, 1879, switches

✓ Claim 7 - Patent to Abresdam #354996, Dec.
23, 1886 cited additionally,

✓ Claim 9 is rejected on a description
(over) ✓

and illustration in La Lumière
Electrique, Mar. 18, 1886, p. 370

Chairs 1 to 6 and 8 and 9 are re-
jected on an illustration and de-
scription found in Annales Tele-
graphiques, 3rd Series, Tome XII, 1885,
p. 460

Journal of the Society
Journal of Telegraph Engineers and Elec-
tricians.

Vol. 15, No. 62 p. 305 et seq.

1886.

May 12

"The Telephone as a Receiving Instru-
ment in Military Telegraphy"
Paper by Capt. P. Cardew.

"I have been asked to give you a
short account of the system of tele-
graphy with vibration currents using
the telephone as a receiving instru-
ment, which was invented by me
five years ago, and has since been
used with considerable success in
several campaigns.

XXXXXX

"The system which I am about to de-
scribe has been kept a secret by
us hitherto.

XXXXXX

"This idea [of using telephones
instead of Morse receivers] was
worked up for some time. It was
found that there was some difficulty
in reading, due to the almost per-
fect similarity of the make and
break clicking of the telephone.

xxxxxx

"Some experiments had also been carried out at this time with Ponce vibrating sounders sent for trial by Messrs. Thillier.

"They consisted of simple electro-magnets, the armature's being attached to a piece of German Silver spring fixed at both ends, and with a contact screw so arranged that when the armature was attracted it broke the current through the coils, in fact just on the same principle as an ordinary chattering bell, but arranged to give a musical note.

"They were intended to be used as ordinary sounders, but the difficulty was that they interfered with each other if more than two were used on one circuit."

(Then follows a detailed account of experiments in telegraphing through 15 or more miles of bare wire laid upon the ground, the apparatus shown in Figs 1 and 2 being used.)

"A new pattern of vibrator was however then considered essential, and this was the pattern designed

(See Fig B). As the noise made by the vibrator and the telephone at the sending end was sometimes a nuisance, it was reduced to a minimum in this instrument by using a very light armature - simply a ^{thin} piece of ferrotype or tinned iron - and by means of this small key at the side of the signalling key, which when depressed by one finger, short-circuited the telephone.

xxxxxx

In 1883 some experiments on General Post Office wires were made with this system, of which the following is a condensed report.

xxxxxx

"4th Experiment:- Two parallel wires between New Cross and Chatham, fitted with ordinary ink writers, also, between the two ^{transmitters} vibrators and condensers as in diagram.

This was an idea of mine ^{Chief Clerk to G.P.O.} for an independent vibration circuit superposed on ordinary working, and was quite successful, all three circuits working independently, - signals audible

with two and good with ten coils
 on vibrators - 30 on the Morse
~~xxxxxx~~
 in commenting on these experi-
 ments on 10th October, 1883, re-
 marked, "It is worth consideration
 whether the system of working tried
 successfully in experiment 4 could
 not be usefully adopted in the postal
 telegraphs. The method is much im-
 proved by the addition of mag-
 nets on the Morse circuit, as the Morse
 clicks can be practically softened off
 in the telephone to such an extent
 by being passed through the coils of
 a magnet as to avoid all interfer-
 ence with the vibration signals."

~~xxxxxx~~
 In order to simplify the connec-
 tions for field purposes, I obtained
 some "M. T." condensers and magnet
 coils and fixed them inside a
 small box ~~xxxxx~~ To these boxes I
 give the name of 'separators'. The
 instructions were simple "Join the
 Morse to M, the line to L and the
 vibrator to V and fire away!"

~~xxxxxx~~

"Quite recently an account has ap-
 peared in the papers of a some-

what similar system brought out
by Mr. Edison, and marked with
his usual ingenuity. No doubt it
will be taken up now that the
patent belongs to another coun-
try.

xxxxxxx.

"We are not yet quite satisfied
with our pattern of vibrating trans-
mitter, and Messrs. Thelen, who un-
consciously produced the first one,
have recently brought out an improved
pattern, which, with some modifi-
cations will probably be adopted.

"It is worked on a primary low
resistance-coil, and the secondary
coil throws an alternating induced
current on line."

xxxxx

Fig 1

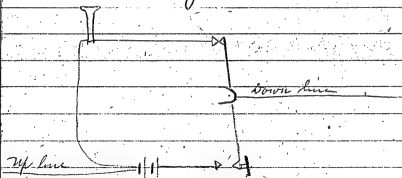
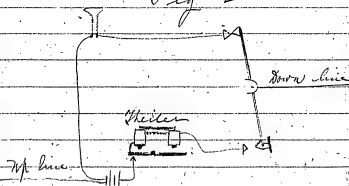


Fig 2



J. S. 100

Case's, Tyer, Blomdett &
100 York

Prices of and Annual

File

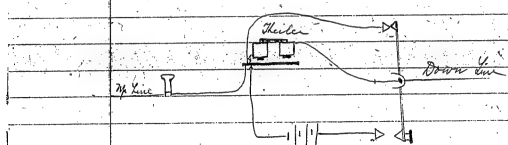
Class

See performance

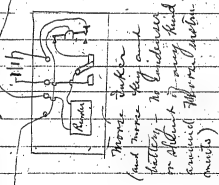
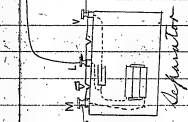
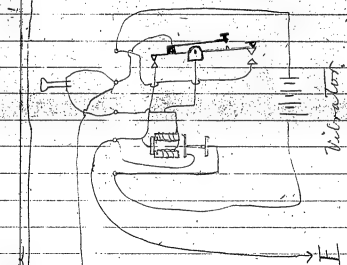
aligned in the

7

Fig 3



B



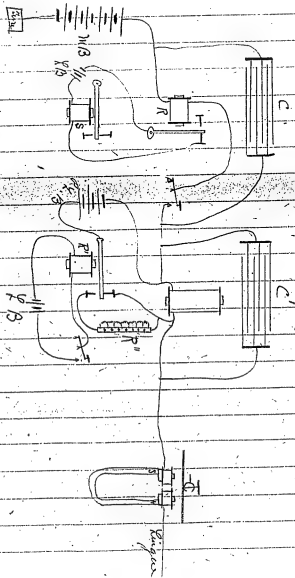
I think key is meant to be connected as here shown instead of as in drawing.



9

L'Amateur Électrique — May 15, 1886 —
 Zone 20 —

Un nouveau système de Télégraphie Duplex
 (au moyen de l'Edison Phonograph)
 by Geo. Nitzler



Abandoned Patent Applications, Case 704
Systems of Electrical Distribution
(filed December 6, 1886)

Applicant.

Address.

Edison

Riverview Park, N.Y.

Title

Systems of Electrical Distribution

Filed

Dec. 6-1886

Examiner's Room No.

117-

Assignee

Ass't Exec.

Recorded

Liber

Page

Patent No.

Issued

ACTIONS.

1. Ref'd O. Jan 28/87
2. Lto O. Mar 7/87
3. Replied Mar 9/87
4. Amended June 1/88
5. Ref'd O. July 13/88
6. Replied Oct 11/89
7. Lto O. Oct 17/89
8. Replied Nov 16/89
9. Amended Mar 10/90
10. Ref'd O. Apr 15/90
11. Lto O. Dec 3/91
12. Replied Dec 10/91
13. Ref'd O. Jan 2/93
14. Invented, Halber & Hallenby, Nov 16/93
15. Assoc. P. G. A. to D. W. Feb 28/95
16. Int. decided in favor of Hallenby, Jan 23/96
17. (invented by F. L. O.)
18. Replied Aug 3-1896
19. Amended Oct 23/97
20. Replied Nov 23/97
21. Replied Oct 2/97
22. Replied Oct 8/97
23. Amended Dec 2/97
24. Allowed Dec 18/97
- 25.
- 26.
- 27.
- 28.
- 29.
- 30.

DYER & DRISCOLL,

31 Nassau Street,

NEW YORK CITY.

204
264
TO ALL WHOM IT MAY CONCERN:-

Be it known that I, Thomas A. Wilson of Haddonfield Park, in the County of Essex and State of New Jersey, have invented a certain new and useful -----Improvement in Systems of Electrical Distribution (Case No. 794) ---- of which the following is a specification.

My invention relates to that class of systems of electrical distribution in which a source of electricity of high tension and converters for reducing the tension ~~film~~ to that required for transmitting devices are provided; and more especially it relates to systems in which the converters are placed at sub-stations, where devices are placed for regulating the current discharged by the converters, in addition to the regulating devices at the main station or high tension source.

My invention consists in the novel devices and arrangements and combinations of devices hereinafter described and claimed.

In the accompanying drawing Figure 1 is a diagram of a system embodying my invention; and figure 2 an enlarged illustration of the converters.

A represents an alternating current dynamo electric machine generating a current of high tension situated at the main station at a place where power is conveniently and economically available and forming the high tension source. A continuous current generator B is provided for energizing the field magnets of generator A, and an adjustable resistance C is provided in the circuit of generator B for regulating

the strength of said field magnets.

From generator A, a circuit 1,2, extends which is of small conductors since it is required to convey only the high tension current. At suitable points within or near areas or localities to be supplied with current are provided sub-stations where are placed tension-reducing convertors D, which convertors are shown as induction coils adapted to receive the high tension current of circuit 1,2, in their primary coils and to discharge an induced current of low tension in a circuit 3,4, extending from their secondary coils. At each sub-station I have shown a divided induction coil or two coils having their primaries in series and their secondaries also in series, and a compensating conductor 5 extending from the conductor joining their secondaries whereby they form the divided source of a three wire or compensating system. The circuit 3,4, is a feeding circuit extending to a system ^{connected and intersecting} of mains or lighting circuits p n n, -- positive, compensating and negative, from which the house circuits including translating devices (not shown) in multiple series are connected as is now common in the Edison three ^{wire} or compensating system.

The convertors of the three sub-stations shown are all connected alike and are all in series on the main high tension circuit 1,2.

For regulating the current supplied by each convertor to its own system of translation circuits, the secondary coil of each convertor is divided into two or more sections a a joined together in series at one end and each having a free terminal at the other end; and the conductors 1 and 2 are provided each with a switch-arm b whereby a greater or less

number of the sections may be placed in circuit and a greater or less current supplied to either side of the system. By separately adjusting the converters the two sides of the system are regulated to maintain the balance as changes occur in the relative number of translating devices on the two sides; and by the simultaneous adjustment of both converters the whole current supplied is regulated. Electrical indicators e c are connected across each three wire circuit as shown whereby the potential is constantly indicated, and it is in accordance with these indications that the regulation above described is accomplished.

At the main station, indicating devices for the high tension circuit are provided. I have shown an indicator d for electro-motive force connected across the circuit, and an indicator g for current, in a shunt from said circuit. These indicators show changes in current and electro-motive force which occur in the system and in accordance with this showing the generator A is regulated by the adjustment of the resistance C.

These indicators are such as are set forth in my application No. 694 --- Serial No. being composed of two coils in the same circuit so as not to be affected by changes in polarity and therefore ^{being} adapted for systems employing alternating currents.

Thus the whole current supplied to all the districts is regulated at the main station while at each sub-station the regulation for its particular district is accomplished.

WHAT I CLAIM IS:-

FIRST: In a system of electrical distribution, the combination of a source of electricity of high tension, a main circuit extending therefrom, two or more sub-stations, tension reducing converters at said sub-stations all connected with said main circuit, and translation circuits supplied by said converters, substantially as set forth.

SECOND: In a system of electrical distribution, the combination of a source of electricity of high tension, a main circuit extending therefrom, two or more sub-stations, tension reducing converters at said sub-stations all connected in series with said main circuit and translation circuits supplied by said converters, substantially as set forth.

THIRD: In a system of electrical distribution, the combination of a source of electricity of high tension, a main circuit extending therefrom, two or more sub-stations, tension reducing converters at said sub-stations connected with said main circuit, and a connected system of translation circuits supplied from each sub-station by feeders extending from the converters thereat, substantially as set forth.

FOURTH: In a system of electrical distribution, the combination of a source of electricity of high tension, a main circuit extending therefrom, sub-stations, tension reducing converters at said sub-stations connected with said main circuit, translation circuits supplied from said converters, means for regulating the current supplied from each converter and means for regulating the high tension source, substantially as set forth.

1-2-3-4-5-6 in and of Jan 24/88

7 ~~SEVEN~~ In a system of electrical distribution, the combination of a source of electricity of high tension, a circuit extending therefrom, a tension reducing converter ^{at a sub station} having its primary coils connected with the high tension circuit and secondary coils supplying translating devices and means for varying the number of turns of the secondary coils in circuit, substantially as set forth.

8 ~~EIGHT~~ In a system of electrical distribution, the combination of a source of electricity of high tension, a circuit extending therefrom, two or more tension reducing converters ^{at a sub station} having primary coils in series in the high tension circuit, and secondary coils supplying translating devices, and means for varying the number of turns of the secondary coils in circuit, substantially as set forth.

9 ~~NINE~~ In a system of electrical distribution, the combination of a source of electricity of high tension, a main circuit extending therefrom, sub-stations, converters at said sub-stations having primary coils connected with the main circuit, and secondary coils supplying translating devices, means for varying the number of turns of the secondary coils in circuit and means for regulating the high tension source, substantially as set forth.

Spec. Nov. 29
Dash Dec. 4

(2-020.)

Room No. 20,
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

SERIES OF 1880
221,508
NOV 11 1880

Case 704
DEPARTMENT OF THE INTERIOR,

United States Patent Office,
Washington, D. C. Dec 6, 1886

SIR:

I have to acknowledge the receipt of the petition, specification, and drawing of your
alleged improvement in *Systems of Electrical Distribution*

with Fifteen Dollars as the first fee payable thereon.

The papers are duly filed, and your application for a patent will be taken up for
examination in its order.

You will be duly advised of the examination.

Very respectfully,

W. M. Montgomery

Commissioner of Patents.

Thos A Edison
2 Dyer Bldg
44 Wall St nyc

NOTE.—In order to constitute an application for a patent, the inventor is by law required to furnish his petition, specification, oath, and drawings, (where the nature of the case admits of drawings,) and to pay the required fee.

No application is considered as complete, nor can any official action be had thereon, until all its parts, as here specified, are furnished in due form by the inventor or applicant.

(1651-20,000)

Any communication respecting this application should give the serial number, date of filing, and title of invention.

AS communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(3-68)

Dictated.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE,
MAILED.
JAN 29 1887

M.M.

WASHINGTON, D. C., Jan. 29, 1887.

T. H. Wilson,	}	Subject:
Correspondent,		System of Electrical Distribution.
20 Wall St.,		
N. Y. City.		Filed Dec. 6, 1886 No. 320,696.

Please find below a communication from the Examiner in charge of the application
above noted.

M. M. Montgomery

Commissioner of Patents.

Room No. 27

Claims 1 to 4 are not by English patent 200 of 1881.

Thomas A. Edison.

Systems of Electrical Distribution.

Filed December 6th, 1886.

Serial No. 220,800. (Edison No. 704)

Hon. Commissioner of Patents,

Sir:-

The pertinency of the reference cited against claims 1 to 4 is not obvious to the Attorneys though they have carefully read the patent. It is therefore respectfully requested that the Examiner give such explanation as is called for by Rule 68.

Respectfully,

Att'ys for Edison.

New York, February 7th, 1887.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(2-288.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE,

MAILED.

FEB. 9, FEB. 11, 1887

WASHINGTON, D. C.,

T. A. Edison,

Care Dyer & Seely,

40 Wall St.,

N. Y. City.

Application for patent for
System of Electrical Distribution.

Filed Dec. 6, 1886. No. 220,360.

Please find below a communication from the Examiner in charge of the application
above noted.

M. V. Montgomery

Commissioner of Patents.

Room No. 37

(111-22 11)

English patent of 1881 describes and illustrates a
cordless motor and generator which may be so proportioned as to pro-
duce a current either of higher or lower tension than the main cur-
rent and such devices are described and illustrated as located at
those points on the line where it is desired to utilize current.
Means for regulating are also described.

Claims 1 to 4 must be rejected.

Recess No. 67.

Application of Thomas A. Edison,
Systems of Electrical Distribution,
Filed December 31st, 1888.
Serial No. 220,800, (Edison Co. 722)

To the Commissioner of Patents,

Sir:

In the above named application
we submit the following amendment:

On 2nd page before "rains" in 17th line insert words

--- connected and intersecting ---

Brace claims 1 to 4 inclusive, and insert,-

First: In a system of electrical distribution, the combination with a source of electricity of high tension, and a main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected with said main circuit, and a connected and intersecting system of distributing conductors supplied with a low tension current by the converters at each sub-station, substantially as set forth.

Second: In a system of electrical distribution, the combination with a source of electricity of high tension, and a main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected with said main circuit, feeders extending from the converters at each sub-station and

*Edison's
Jan 21. 96*

Edison

a connected and intersecting system of distributing conductors supplied by the feeders from each sub-station with a low tension current, substantially as set forth.

Examiner
Oct 2, 91

~~What:~~ In a system of electrical distribution, the combination with a source of electricity of high tension, and a main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected with said main circuit, a connected and intersecting system of distributing conductors supplied with a low tension current by the converters at each sub-station, indicators for showing the pressure of such low tension current and means for regulating such pressure, substantially as set forth. *Rejected*

2

~~Claim:~~ In a system of electrical distribution, the combination with a source of electricity of high tension, and a main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected with said main circuit, a feeders extending from the converters at each sub-station, a connected and intersecting system of distributing conductors by the feeders from each sub-station supplied with a low tension current, *Rejected* indicators for showing the pressure of such low tension current and means for regulating such pressure, substantially as set forth. *Rejected*

Change the numerals of the 5th, 6th and 7th claims to 7th, 8th and 9th, and insert the following additional claims.

1 \$

~~Fifth:~~ In a system of electrical distribution, the combination with a source of electricity of high tension, and a main circuit extending therefrom to two or more sub-stations

or centers of distribution, of tension reducing converters at each of said sub-stations connected with said main circuit, ^{in series} and a connected and intersecting three-wire system of distributing conductors supplied with a low tension current by the converters at each sub-station, substantially as set forth. *allowed.*

2 ~~4 SIXTH~~ In a system of electrical distribution, the combination with a source of electricity of high tension, and a two-wire main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected with said main circuit, ^{in series} and a connected and intersecting three-wire system of distributing conductors supplied with a low tension current by the converters at each sub-station, substantially as set forth. --- *Allowed.*

The Examiner will now find the claims clearly distinguished over the reference.

Respectfully,

Att'ys for Wilson.

New York, June 22nd, 1888.

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

(2-086.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

U. S. PATENT OFFICE,
MAILED.
JUL 14 1888

WASHINGTON, D. C., July 13, 1888, 188 .

Thomas A. Edison, } Application for patent for System of
Care--Dyer & Seely, } Electric Distribution.
#40 Wall St., }
N. Y. City, } Filed Dec. 6th, 1886. No. 220,800.

Please find below a communication from the Examiner in charge of the application above noted.

Benton J. Hall

Commissioner of Patents.

Room No. 87.

(2-6-08)

In the amended and added claims filed June 28rd, applicant appears to have simply claimed the use of the old system of generation and distribution shown in the English patent #200 of 1881 before cited, to supply several independent, connected and intersecting systems of the type covered by previous patents to him. No change in the relation of the parts is indicated, and the claims must be held to cover only an aggregation of the two systems; English patent #3379 of 1885, (Fig. 4) is added as a substantial anticipation of the claims.

42 communications should be addressed to
"The Commissioner of Patents
Washington, D. C."

(2-886)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.



WASHINGTON, D. C., Oct. 11, 1889.

Thomas A. Edison,
Care--Dyer & Seely,
#40 Wall Street,
N. Y. City.

Subject: System of Electrical Dis-
tribution.

Filed Dec. 8, 1888. No. 220,800.

Please find below a communication from the EXAMINER in charge of the application
above noted.

C. E. Mitchell

Room No. 87.....

Commissioner of Patents.

Upon further consideration claims 7, 8 & 9 are found to
be met in patents of Kidder, #38,625, Aug. 10, 1889, reissued Jan.
4, 1878, #3,840, and Hicks, #238,700, Sept. 5, 1882.

These claims are therefore rejected.

If applicant desires to overcome the above references
either by argument or by filing proofs of priority, he is required
to do so on or before October 26th; if this is not done, the case
will be ignored in consideration of a possible interference.

APPLICATION OF THOMAS A. EDISON
SYSTEM OF ELECTRICAL DISTRIBUTION
FILED OCTOBER 6, 1888
SERIAL No. 220800.

TO THE COMMISSIONER OF PATENTS:-

S I R :

In the above case we have to ask a re-consideration of the official action rejecting claims 7, 8, and 9 on the patents to Kidder and Hicks. Each of these claims contains matters of invention as it seems to us, which are not found in the references. Neither of the patents referred to has a system of electrical distribution or a tension reducing converter or any translating devices in the secondary circuits, and they do not have converters of any kind in series as claimed in applicant's eighth claim; or any sub-stations or any means for regulating the high tension source as claimed in the 9th claim. The patent to Kidder does not show anything for varying the secondary coils, but only a device for throwing different primary coils into circuit. Both the references show simply electro medical shocking machines and such apparatus is entirely distinct in character and purpose from the devices claimed by applicant. It is thought that if any interference is declared on this subject matter of the claims referred to, applicant is entitled to be included in it so far as the patents of Kidder and Hicks are concerned.

Respectfully,

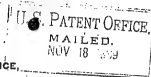
Attorneys for Edison.

Dated, New York, October 17, 1888.

All communications should be addressed to
"The Commissioner of Patents
Washington, D. C."

(2-686)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,



WASHINGTON, D. C., Nov. 18, 1888.

Thomas A. Edison,
Care--Dyer & Seely,
#40--Wall St.,
N.Y. City.

Subject: System of Electrical
Distribution.

Filed Dec. 6, 1886. No. 220,800

Please find below a communication from the EXAMINER in charge of the application
above noted.

C. E. Mitchell

Room No. 47

Commissioner of Patents.

The Examiner still believes that the references cited in last official action meet the invention covered by the claims then rejected. The same result is sought, viz: to vary the strength of the current by varying the length of the coil in circuit. The character of the current or the construction of the transformer do not affect this action.

The claims referred to must be again rejected.

IN THE UNITED STATES PATENT OFFICE.

Thomas A. Edison.

System of Electrical Distribution.

Filed December 31st 1888.

Serial No. 280,800.

---ooo---

Commissioner of Patents,

Sir:-

In the above-entitled application the following amendment is submitted.

Amend claim 7 by inserting after "converters" line 3, the words "at a sub-station".

Amend claim 8 by inserting after "converters" line 4, the words "at a sub-station".

Claims 7 and 8 have been amended to more clearly bring out the fact that the converters are placed at the sub-stations. This feature is already in claim 9. There is clearly nothing corresponding to this in the references cited against these claims. The whole device shown in each of the references corresponds to the source of electricity of high tension mentioned in applicant's claims and the regulation of the patents is a regulation of the generator. Applicant is not attempting to claim the principle of varying the strength of the current by varying the length of the coil in circuit as would seem to be intended by the Office letter of November 16th 1889. He is claiming merely a certain arrangement of circuits and devices which compose a useful and efficient lighting system.

As understood from the last Office letter the last ^{three} ~~xxx~~ claims only were rejected. In view of what has been said a favorable reconsideration of said claims is requested.

March 31st 1890. Respectfully,

Att'ys.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

U.S. PATENT OFFICE
MAILED.
APR 16 1890

WASHINGTON, D. C., April 15, 1890

Thomas A. Edison,
Care--Dyer & Seely,
#40--Wall St.,
N. Y. City.

Subject: System of Electrical Dis-
tribution.

Filed Dec. 6, 1888. No. 220,800

Please find below a communication from the EXAMINER in charge of the application above noted.

Room No. 87
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

C. E. Mitchell

Commissioner of Patents.

The references cited as covering the regulation of the current delivered to the translating devices by varying the active length of the secondary of the induction coil are withdrawn.

In view of the fact that several parties are claiming the same subject-matter, all doubts as to patentability will be solved in favor of the applicants and an interference will be declared.

Any communication respecting this application should give the serial number, date of filing, and title of invention.

F. A. EDISON

SYSTEM OF ELECTRICAL DISTRIBUTION

SERIAL NO. 220,000

FILED DECEMBER 6, 1890

TO THE COMMISSIONER OF PATENTS,

S I R :-

Attention is called to the Office letter of April 15, 1890. It is requested that this application be passed to issue or the interference referred to be declared at an early date.

Respectfully,

Attorneys for Edison.

New York, December 3, 1891.



(8-871 a.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., December 15, 1891.

T. A. Edison,
Care Dyer & Seely,
No. 40 Wall St.,
New York, N. Y.

Subject: System of Electrical Distribution

Filed Dec. 6, 1886. No. 220,800.

Please find below a communication from the EXAMINER in charge of the application above noted.

Room No. 67

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

W. E. Simonds

Commissioner of Patents.

The references cited in rejection of claims 1 to 6 inclusive have never been withdrawn or overcome by the applicant. The later official letters referred especially to claim 7, 8 and 9, first rejecting these claims on certain references, and afterwards withdrawing these references, but did not withdraw the references cited to claims 1 to 6

Upon re-examination of this case, claims 7, 8 and 9 are found to be met in German patent of Deri, No. 33951, Feb. 18, '85. This patent is also a substantial anticipation of claims 1 to 6 inclusive. This reference has come to the knowledge of the Examiner since last official action.

(2-571a)

U.S. PATENT OFFICE
MAILED

JAN 23 1893

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., January 21, 1893.

Thos. A. Edison,

J. Dyer & Seely,

36 Wall St.,

New York City.

Subject: Systems of Electrical Dis-
tribution.

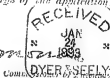
Filed Dec. 6, 1886. No. 220,800

Please find below a communication from the EXAMINER in charge of the application
above noted:

Room No. 87--

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

W. E. Smith



Any communication respecting this application should give the serial number, date of filing, and title of invention.

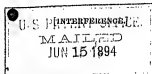
The references cited against claims 7, 8 and 9 covering
the regulation of the current delivered to the translating de-
vices by varying the active length of the secondary of the in-
duction coil is withdrawn.

In view of the fact that several parties are claiming
the same subject-matter, all doubts as to patentability will be
solved in favor of the applicants and an interference will be de-
clared.

The rejection of claims 1 to 6 inclusive in former Of-
fice letters has not been overcome by action on the part of appli-
cant. These claims will be held subject to such further action
as may be necessary after the interference has been concluded.



(2-001.)



DEPARTMENT OF THE INTERIOR,

United States Patent Office,

Washington, D. C., June 4th, 1894.

Thos. A. Edison,.....

C/o Dyer & Seely,.....

Interference No. 16628

#36 Wall St., N.Y. City.

Please find below a copy of a communication from the Examiner concerning your application for patent for "Systems of Electrical Distribution," filed Dec. 8, 1888, Ser. No. 220,800.

Very respectfully,

Room No. 85

All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

D.C.



Commissioner of Patents.

Your case, above referred to, is adjudged to interfere with others, hereafter specified, and the question of priority will be determined in conformity with the Rules.

The statement demanded by Rule 110 must be sealed up and filed on or before the 11 day of July, 1894, with the subject of the invention, and name of party filing it, indorsed on the envelope. The interference number should also be indorsed thereon. The subject-matter involved in the interference is

INVENTION.

"The combination of a main line, a converter having its primary coil included in the main line, conductors leading from different points in the length of the secondary coil, translating devices or groups of the same, and a circuit-controller for includ-

R.

ing said translating devices or groups of the same between different conductors leading from the secondary coil, at will."

This is Shallenberger's 1st claim, (claims 2, 3, 7 and 8 being held subject thereto); substantially claim 3 of Halleck, and substantially claim 9 of Edison, claims 7 and 8 also being held subject thereto.

The interference is with an application of Millard Fillmore Halleck of Washington, D.C., (Admr. of Wm. E. Sawyer) whose attorney of record is Chas. J. Kintner, #45 Edwy., N.Y. City.

Also with an application of O.B. Shallenberger of Rochester, Pa., (Assr. to The Westinghouse Elec. & Mfg. Co., of Pittsburgh, Pa.) whose attorneys of record are Terry & MacKaye, Pittsburgh, Pa.

The remaining claims of each party will be held subject to such further revision or restriction as may be found necessary after the conclusion of this interference.

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APPLICATION OF THOMAS A. EDISON :
SYSTEMS OF ELECTRICAL DISTRIBUTION :
FILED DECEMBER 4, 1886 :
SERIAL NO. 220,800 :

ROOM NO. 87.

TO THE COMMISSIONER OF PATENTS,

S I R :-

We hereby appoint DYER & DRISCOLL (a firm composed of Richard N. Dyer, Daniel H. Driscoll and Samuel O. Edmonds), of No. 36 Wall Street, New York City, our associates in the prosecution of the above named application, and request that all future communications be addressed to them, and that the Letters Patent when issued be forwarded to them.

Respectfully,

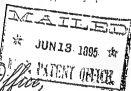
Attorneys for Edison.

New York City, February 28, 1895.

2-000 c.

Room No. 44.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,



United States Patent Office,

Washington, D. C., June 13, 1895.

IN RE INTERFERENCE

Hallen & Edison

Interference No. *16,628*

Challenger

Before the Examiner of Interferences.

Subject-matter: *System of Electrical Distribution*

Please find below a communication from the Examiner of Interferences in regard
to the above-cited case.

John S. Exum

Commissioner of Patents



The day heretofore set for *final hearing*
having passed, and *Hallen and Edison*

as each
the junior party having failed to file *any testimony*
within the time allowed for that purpose, judgment of priority of invention is
hereby rendered *in favor of Class B*
Challenger

in accordance with the provisions of Rule *116*
Limit of appeal will expire *July 3-1895*

11000 b-3 m

J. A. Edison
J. Edgar & Son
N. Y. City

In the Matter of the Application)
of *Thomas A. Edison*)
for an improvement in *Systems*)
of Electrical Distribution)
Filed *Dec. 6, 1886*)
Serial Number *220 800*)
Examiner's Room No. *87*)

APPLICATION FOR
LETTERS PATENT.

HONORABLE COMMISSIONER OF PATENTS,

S I R :

In the above entitled application, we
hereby appoint MR. FRANK L. DYER, of No. 918 F. Street, N.W.,
Washington, D. C., our associate, and request that all fur-
ther communications be sent to him.

Respectfully,

Attorneys of Record.

We hereby withdraw from the above case as associate
attorneys.

Associate Attorneys of Record.

New York, N. Y.

July 30, 1895.

Thomas A. Edison

December 6, 1886.

220,000.

85.

System of Electrical Distribution.

Attachment.

Between lines 7 & 18, and also in the marginal of
lines 8 to 7, and insert:-

8. In a system of electrical distribution, the
combination of a source of electricity of high tension,
a circuit or circuits therefrom, two tension reducing con-
verters the primary coils of which are in connection with
said high tension circuit or circuits, a secondary coil for
each converter, means for varying the number of the turns
in circuit of the secondary coil of each converter, and a
three-wire consumption circuit, each side of which is supplied
from one of the secondary coils of said converters, sub-
stantially as set forth.

9. In a system of electrical distribution, the
combination of a source of electricity of high tension, means
for regulating the same, a circuit or circuits therefrom, two
tension reducing converters the primary coils of which

are connected with said high tension circuit or circuits, secondary coils for said converters, means for varying the number of turns in circuit of the secondary coil of each converter, and a three-wire consumption circuit, each side of which is supplied from one of the secondary coils of said converters, substantially as set forth.

10. In a system of electrical distribution, the combination of a source of electricity of high tension, a circuit therefrom, two tension reducing converters the primary coils of which are in series with the high tension circuit, secondary coils for said converters, means for varying the number of turns in circuit of the secondary coils of each converter, and a three-wire consumption circuit, each side of which is supplied from one of the secondary coils of said converters, substantially as set forth.

11. In a system of electrical distribution, the combination of a source of electricity of high tension, a circuit therefrom, a series of tension reducing converters arranged in pairs and having primary wires connected in series with the high tension circuit, a secondary coil for each converter, means for varying the number of turns in circuit of the secondary coil of each converter, and a three-wire consumption circuit for each pair of converters, one side of each circuit being supplied from one of the secondary coils of each pair of converters, substantially as set forth.

Same

12. In a system of electrical distribution, the combination of a source of electricity of high tension, a circuit or circuits therefrom, two tension reducing converters having primary coils connected with the high tension circuit or circuits, secondary coils for said converters, means for varying the number of turns in circuit of the secondary coil of each converter, a three-wire consumption circuit, each side of which is supplied from one of the secondary coils of said converters, and a volt-meter in multiple arc with the circuits supplied by each secondary coil for indicating the voltage thereof.

Remarks. Claims 7 and 9 are erased in view of the issue of interference No. 16,628, with Shallenborger and Hallock. Present claim 7 by being limited to the inclusion of the primary coils of two or more converters in series in a high tension circuit, is thought to be clearly distinguished from said issue.

Claims 8, 9, 10, 11 and 12, inserted by the above amendment, cover the feature of employing two converters for supplying a three-wire circuit and it is thought are allowable.

Applicant has again carefully read the specification of English patent No. 200 of 1881, but fails to see the pertinence of that patent as a reference to the first six claims. The specification is obscure and indefinite, and so far as

applicant sees, describes neither tension reducing converter, nor does it disclose the idea of reducing a high tension current. Far less does this patent disclose the specific combinations embraced in the claims against which it is cited. It is respectfully requested therefore, that the Examiner, if he still relies upon this patent, will kindly indicate to applicant that portion thereof which he considers to be an anticipation of the claims.

Very respectfully,

Thomas A. Edison.

By

A Solicitor Attorney.

Washington, D. C.

Room No.85.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

U.S. PATENT OFFICE
MAILED

AUG 3 1898

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., Aug. 3, 1896.

T.A. Edison,

C/o F.L. Dyer,

#918-F St., N.W.,

City.



Please find below a communication from the EXAMINER in charge of your application
for patent for "Systems of Electrical Distribution," filed Dec. 6,
1886, Ser. No. 220,800.

John S. Seymour

Commissioner of Patents.

In Fig. 7 of the drawings of the British patent, #200 of
1881, is shown a system in which a high tension source of electrici-
ty feeds a series of tension-reducing or tension-raising devices,
the secondary part of each of said devices being connected to
utilization circuits of various forms. As stated in the office
letter of July 13, 1888, "applicant appears to have simply claimed
"the use of the old system of generation and distribution shown in
"the English patent #200 of 1881 before cited, to supply several
"independent connected and intersecting systems of the type covered
"by previous patents to him." Such an interconnected system is

220,800.

2.

shown in the patent to Edison, #266,793, Oct. 31, 1882, "Lighting, Systems." For the above reasons, claims 1 to 4 inclusive must be rejected.

Claims 7 to 12 inclusive are rejected on the patent to Edison, #524,378, Aug. 14, 1894, "Systems of Distribution," in view of the fact that applicant has been defeated in an interference with Shallenberger and Halleck upon an issue covering the regulation of secondary electro-motive force of a transformer by connecting the secondary conductors at various points in the length of the secondary coil. To substitute this form of regulation for that shown in the patent above cited involves no invention.

APPLICATION OF *T. A. Edison,*
IMPROVEMENT IN *System of Electrical*
Distribution, ROOM No.
FILED *Dec 6, 1886.*
SERIAL No. *220, 805.*

HON. COMMISSIONER OF PATENTS.

S I R :

In the above named application, we hereby revoke the
associate power of attorney heretofore given to Mr. Frank L.
Dyer, of 918 F. Street, N.W. Washington, D.C., and reappoint
in lieu thereof Messrs. Dyer & Driscoll, of 36 Wall Street,
New York City, and request that all communications be sent to
them as said associate attorneys.

Respectfully,

Dyer & Seely.
Attorneys of Record.

New York, November 21, 1896.

AMENDMENT TO THE APPLICATION OF T. A. EDISON :
SYSTEMS OF ELECTRICAL DISTRIBUTION :
FILED DECEMBER 6, 1886 :
SERIAL NO. 220,800 (Edison No.704) :

ROOM 87.

TO THE COMMISSIONER OF PATENTS,

S I R :-

In the above named application the following amendment is submitted:

Erase claims 1 and 2, and number 3, 4, 5 and 6, as 1, 2, 3 and 4.

Erase claims 7 to 12, and substitute:

3 ----- 5. In a system of electrical distribution, the combination with a source of electricity of high tension and a main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected with the main circuit, a connected and intersecting 3-wire system of distributing conductors supplied with a low tension current by the converters at each sub-station, and means for regulating at each sub-station the current supplied to said 3-wire system, substantially as set forth.

4 6. In a system of electrical distribution, the combination with a source of electricity of high tension and a main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected with the main circuit, a connected and intersecting 3-wire system of distributing conductors supplied with a low tension current by the converters at each sub-station, indicators at each sub-station for showing the ^{Potential} amount of current delivered through the converters, and means for regulating at each sub-station the current supplied to said 3-wire system, substantially as set forth.----- ^{Potential}

NOT OF THE INVENTION
TO BE INVENTED
IN CASE

Though the applicant still contends that the English reference No. 200 of 1881 is too indefinite and obscure to be sufficient as an anticipation of the applicant's claims, still the broader claims 1 and 2 have been erased in the anxiety to get the case in an allowable condition. The added claims are drawn on the lines of former claims 5 and 6 (now 3 and 4), which it is inferred from the Office's last action are allowable. Present claims 5 and 6 cover more limited combinations.

Very respectfully,

Attorneys for Edison.

New York City, January 23, 1897.

U. S. PATENT OFFICE

Room No. 86.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

MAR 23 1897

Any communication respecting this
application should give the serial number,
date of filing, and title of invention.

G. L. H.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C., March 23, 1897.

Thos. A. Edison,

C/o Dyer & Driscoll,

#36-Wall St.,

N. Y. City.



Please find below a communication from the EXAMINER in charge of your application

for patent for "Systems of Electrical Distribution," filed Dec. 6,
1886, Ser. No. 220,800.

John S. Edgar

Commissioner of Patents.

Claims 1 and 2 (formerly 3 and 4) are, after careful
reconsideration, rejected on the same references and for the same
reasons as claims 3 and 4 in the last office letter.

Applicant shows potential indicators and not current
indicators at the different sub-stations. Claim 6 should therefore
be revised.

LAW OFFICERS
of
RICHARD N. DYER.

Specialty: Patents and Patent Causes.

Richard H. Dyer. 31 Nassau Street
Samuel O. Edmonds.
Frank L. Dyer. New York City.

SUBSTITUTION OF POWER OF ATTORNEY.
TO THE COMMISSIONER OF PATENTS :

In the matter of the application of
Thomas A. Edison.

for patent for
Systems of Electrical Distribution.
filed December 6, 1886. Serial No. 220,600.

Examiner's Room No. 85.

We, the undersigned, DYER & SEELY, attorneys of record in the above application for patent, do hereby revoke the associate power of attorney heretofore given to Dyer & Driscoll, and do hereby nominate and appoint RICHARD H. DYER, of No. 31 Nassau Street, New York City, (Registration No. 409) as our substitute and as the attorney of the above named applicant to do, permit, suffer and perform all and singular the matters and things which by the power of attorney heretofore given us we are authorized to do, permit, suffer and perform.

New York, September 30, 1897.

AMENDMENT TO THE APPLICATION OF T. A. EDISON

SYSTEMS OF ELECTRICAL DISTRIBUTION

FILED DECEMBER 6, 1896

SERIAL NO. 220,800

(EDISON NO. 704)

ROOM 87

TO THE COMMISSIONER OF PATENTS,

S I R :-

In the above named application the following amendment is submitted:

Erase present claims 1 and 2, and renumber the following claims.

In claim 4 (formerly claim 6) line 8 erase the word "amount" and substitute therefor ---- potential ----

Very respectfully,

Attorneys for Edison.

New York City, October 2, 1897.

Room No. 85.
 All communications should be addressed to
 "The Commissioner of Patents,
 Washington, D. C."

Any communication respecting this
 application should give the serial number,
 date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR,
 UNITED STATES PATENT OFFICE,

WASHINGTON, D. C. Oct. 8, 1897.

Thomas A. Edison,
 c/o Dyer & Driscoll,
 36 Wall Street,
 New York City.



Please find below a communication from the EXAMINER in charge of your application

for Systems of Electrical Distribution, filed Dec. 8, 1886,
 Serial No. 220,800.

Buy Rittorworth

Commissioner of Patents.

Upon careful reconsideration, claims 1 and 2 are rejected on
 the patent to Edison, 287,516, Oct. 30, 1883, Systems of Distri-
 bution.

As to the scope of this patent, applicant states at the
 end of the specification of his patent 524,376, Aug. 14, 1894,
 as follows:

"I do not claim broadly in this application the combination
 of main conductors, tension reducing devices, and a three wire
 consumption circuit or system connected to the secondary of said
 devices, that being included in my patent No. 287,516, dated Oct.
 30, 1883."

THOMAS A. EDISON
SYSTEMS OF ELECTRICAL DISTRIBUTION
FILED DECEMBER 6, 1886
SERIAL NO. 220,800 (Edison No. 704)
ROOM NO. 87

HON. COMMISSIONER OF PATENTS,

S I R :-

In the above entitled application I submit
the following amendment:

Claims 1 and 2, line 5 of each, after "connected" in-
sert ----- in series -----

The above amendment appears to put the case in condi-
tion for allowance.

Respectfully,

Attorney for Edison.

New York City, December 2, 1897.

Issue Patent.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D. C."

2-024.

Serial No. 222900

DEPARTMENT OF THE INTERIOR,

U. S. Patent Office

Washington, D. C.,

Dec 17, 1897

Thomas A. Edison

of New York City

SIR—Your APPLICATION for a patent for an IMPROVEMENT IN

System of Electrical Distribution

Filed Dec 6, 1897, has been examined and ALLOWED.

The final fee, Twenty Dollars, must be paid, and the Letters Patent bear date as of a day not later than SIX MONTHS from the time of the present notice of allowance.

If the final fee is not paid within that period the patent will be withheld, and your only relief will be by a renewal of the application, with additional fees, under the provisions of Section 4897, Revised Statutes.

The Office aims to deliver patents on the day of their date, and on which their term begins to run; but to do this properly applicants will be expected to pay their final fee at least TWENTY DAYS prior to the conclusion of the six months allowed them by law.

The printing, photolithographing, and engraving of the several patent parts, preparatory to final signing and sealing, will consume the interesting time, and such work will not be done until after payment of the necessary fees.

When you send the final fee you will also send, DISTINCTLY AND PLAINLY WRITTEN, the name of the INVENTOR and TITLE OF INVENTION AS ABOVE GIVEN, DATE OF ALLOWANCE (which is the date of this circular), DATE OF FILING, and, if assigned, the NAMES OF THE ASSIGNEES.

If you desire to have the patent issue to ASSIGNEES, an assignment containing a REQUEST is that effect, together with the FEE for recording the same, must be filed in this Office on or before the date of payment of the final fee.

Additional copies of Specifications and Drawings will be charged for at the following rates: Single Copies, unengraved, 10 cents each. The money should accompany the order.

Very respectfully,

Buy Rutterworth

Commissioner of Patents.

After allowance, and prior to payment of the final fee, applicants should carefully scrutinize the description to see that their statements and language are correct, so mistakes not incurred through the fault of the office, and not affording legal grounds for rescission, will not be corrected after the delivery of the letters patent to the patentee or his agent.

Should you desire a change in the name, satisfactory reasons MUST be given therefor on or before the payment of the final fee.

RECEIVED
THE HEAD OF THIS MATTER
SPECIAL

if payment is made by check or draft, the credit allowed is subject to the collection of the same.

THOMAS A. EDISON

SYSTEMS OF ELECTRICAL DISTRIBUTION

FILED DECEMBER 6, 1886.

SERIAL NO. 220,800 (Edison No. 704)

ALLOWED DECEMBER 18, 1897

EXAMINER'S ROOM NO. 87.

CLAIMS ALLOWED:

1. In a system of electrical distribution, the combination with a source of electricity of high tension, and a main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected in series with said main circuit, and a connected and intersecting three-wire system of distributing conductors supplied with a low tension current by the converters at each sub-station, substantially as set forth.

2. In a system of electrical distribution, the combination with a source of electricity of high tension, and a two-wire main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected in series with said main circuit, and a connected and intersecting three-wire system of distributing conductors supplied with a low tension current by the converters at each sub-station, substantially as set forth.

3. In a system of electrical distribution, the combination with a source of electricity of high tension and a main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected with the main circuit, a connected and intersecting three-wire system of distributing

conductors supplied with low^a tension current by the converters at each sub-station, and means for regulating at each sub-station the current supplied to said three-wire system, substantially as set forth.

4. In a system of electrical distribution, the combination with a source of electricity of high tension and a main circuit extending therefrom to two or more sub-stations or centers of distribution, of tension reducing converters at each of said sub-stations connected with the main circuit, a connected and intersecting three-wire system of distributing conductors supplied with a low tension current by the converters at each sub-station, indicators at each sub-station for showing the potential of current delivered through the converters, and means for regulating at each sub-station the current supplied to said three-wire system, substantially as set forth.

Patent Application Casebooks (E-2536, E-2537, E-2538)

These three casebooks cover the period October 1878-April 1884. They contain copies of the claims from Edison's U.S. patent applications. There are also some claims from applications by Otto A. Moses, William Holzer, Calvin Goddard, John Lawson, and Charles S. Bradley. The entries are in order by case number (#166-#619) and relate to electric lamps, dynamos, electric lighting systems, electric railways, ore separators, storage batteries, and telegraphs. Some of the entries are incomplete or contain very little detail, while others are accompanied by illustrations and a substantial text. The relevant dates of filing, rejection, amendment, interference and, if appropriate, dates of acceptance are listed in the margins next to the claims. However, the information in the books was not consistently updated, and the subsequent disposition of the applications was not always recorded.

The patent claims of other inventors have not been filmed. The claims for Edison's issued patents are already available on microfilm (see Thomas A. Edison Papers Microfilm Edition, Part 1, reels 1 and 2). For this reason, only the claims for Edison's abandoned applications have been filmed. In order to identify the abandoned applications, the claims in each casebook entry were compared with the claims of all issued patents that were applied for on the same day. Whenever it appeared likely that the original claims had been amended before the patent was issued, the casebook entry was also compared with the original application in the National Archives (Record Group 241, Records of the Patent Office). Ninety of the applications in these books were subsequently determined to be abandoned. Drawings from many of these abandoned applications can be found on the microfilm among the Patent Application Drawings.

There are four other casebooks (E-2534, E-4398, E-4399, and E-4400) that, for the most part, merely duplicate the information in the three above-mentioned casebooks. Another related item, record book E-2535, contains a listing of patent cases #156-#633, along with the dates of application, filing, fee payment, patent assignment (usually to the Edison Electric Light Company), and, wherever appropriate, the issue date and Patent Office number. This book and the set of duplicate casebooks have not been filmed.

THE REDUCTION RATIO FOR THIS DOCUMENT IS 15:1

166

Filed Dec: 9th, 1878

Rejected, Jan. 20, 1879

Amended Feb. 8 "

Rejected March 3 "

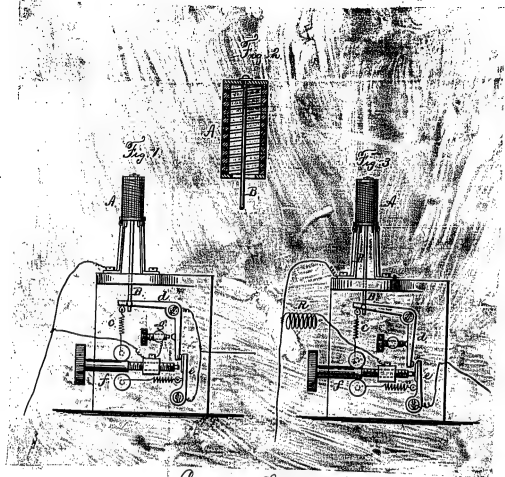
Amended Dec. 31,

Rejected Jan'y. 5, 1880.

Attended ... 12 1867

I have been thinking
and thinking you will be there
I am sure you will be
I am sure you will be
I am sure you will be

Application No. 166.



Electric Light.

blains

Pract. The construction is an electric light of layers of incandescent metal and insulating superinsulation, substantially as set forth.

Second. A spiral or helix of metal with intervening pyroconduction, closely compressed in combination with a thermal circuit regulator, substantially as set forth.

Third. In combination with a continuous electric circuit, and an uninterrupted conductor placed in that circuit forming a light by incandescence, the levers d and e and contact points f and g and circuit connections arranged and acting substantially as set forth.

Foucault. In combination with a continuous electric circuit and an interrupted conductor placed in said circuit and forming a light by incandescence, a branch circuit containing a rheostat corresponding in resistance to the lamp, and circuit closing device

actuated by the heat of the lamp, for opening and closing the shunt or branch circuit, substantially as set forth.

Filed, Mich 10, 1879

Rejected March 22, 1879.

Amended " 29, "

Rejected April 4, "

Amended Jan'y 6, 1880

Rejected " 13, "

Amended " 31, 1880

Rejected Jan'y 11, 1881, Cornell

Amended Aug. 23, 1882

Rejected Sept. 18, 1882

Additional effort, Oct. 10, 1882.

Application assigned

Assignment dated June 21, 1881

Recorded " 24, "

Lib. T. 26 p. 222

Original assignment in safe.

App^{rs} No. 172

(Electric Light)

No Drawing

Electric Light.

Claims.

First. A conductor for electric lighting by incandescence formed of a powdered insulating oxide, the particles of which are retained in contact with each other, substantially as set forth.

Second. A candle for an electric light, formed of fine conducting particles contained within a tube, substantially as set forth.

Appⁿ No. 179

Filed July 7, 1879
 Rejected, July 14, 1879
 Amended, Dec 17, 1880
 Rejected, " 26, "
 Amended, " 25, 1882
 Rejected, March 29, 1882
 Admitted, April 10, 1882
 Amended March 14, 1884
 Rejected " 31st "

Application assigned

Assignment dated June 21, 1881

" recorded " 24 "

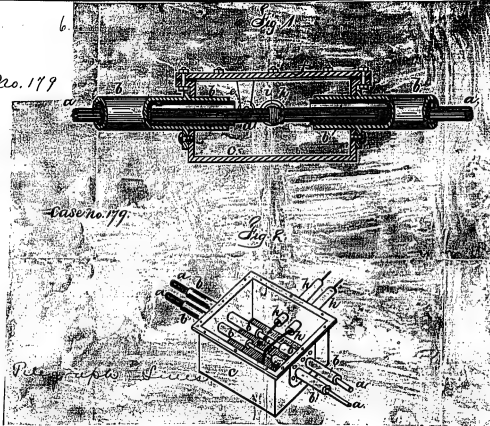
Liber T²⁶ p. 222

Original assignment in safe

1st claim injected in
 Eng. patent 467 of 1878
 3862 of 1873

2^d pat. of America
 136,962, Dec 18, 1873
 Eng. patent 566 of 1880
 " 875 - 1885
 also, on 2nd claims.

Revised 165, 535, July 13, 1873



claims

1. The combination with one or a series of electric conductors, of a metallic tube lined with a non-conducting substance, substantially as set forth.
2. The metallic tube, lined with non-conducting material, such as hard rubber, in combination with metallic boxes lined with similar material and uniting the tubes, and the conductors passed through such tubes, substantially as set forth.
3. The metallic tube lined with non-conducting material, in combination with the boxes for uniting such tubes, and the pulleys and cords for passing the conductors through such tubes, as set forth.

Filed, Dec. 11, 1879.

Letter from office December 3, 1879.

Amended January 2, 1880

Interference with Lawyer Tellan

Amended March 10, 1882

(claims added to prevent S. & C. obtaining any other claims without notice to us)

Additional, off'd Oct 10 5/852

Application assigned to Co.

Assignment dated June 21, 1881

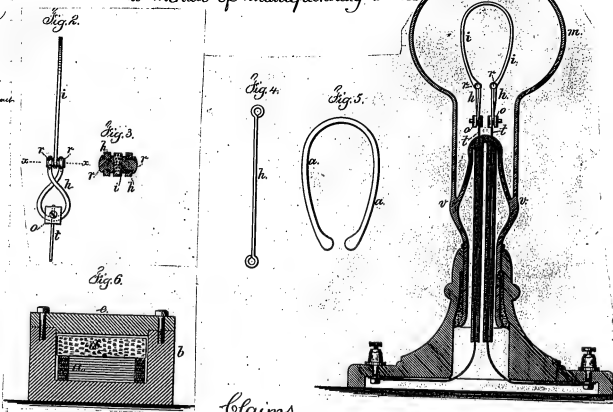
" recorded " 24/ "

Lib. T³⁶ p. 222

Original assignment in safe.

App^{re} No. 187

Electric Lamp and method of manufacturing same



Claims.

First. The manufacture of carbons for electric lights from paper.

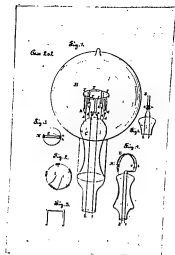
Second. The method herein specified of manufacturing carbons for electric lights consisting in exposing the filaments of paper to the action of heat in a vessel to drive off the volatile portions and carbonize the paper, substantially as set forth.

Third. A carbon for electric lights made as a filament with the ends broader for the clamping device that connect the supports.

Fourth. The clamp for the carbon of an electric lamp composed of a bow or elliptical spring with the ends crossing each other and receiving between them the carbon, substantially as set forth.

Filed, Feb. 5, 1880
 Rejected, March 30, 1880
 Amended, April 20, "
 Rejected, Sept. 20, "
 Argued, Dec. 9, "
 Rejected " 15, "
 Amended July 26, 1882
 Rejected Sept. 13th 1882
 Additional affd Oct 10th 1882

Appx No. 202



Electric Lights and Systems of Electric Lighting.
Claims.

- Application assigned to Co.
 Assignment dated June 21, 1881
 " recorded " 24 "
 Libr at ²⁶/₁₀ p. 222.
1. In a system of generation, distribution and translation of electricity for purposes of light, the method of diminishing the amount of metal required in a given length of main conductors, by increasing the resistance of the lamps, substantially as described.
 2. An incandescing conductor formed of several separate conductors joined together, substantially as set forth.
 3. An incandescing conductor formed of a strip doubled upon itself, so as to increase the resistance in a given radiating surface, substantially as set forth.

Dec. 15, 1880

All claims rejected on
 reference to

Fane's Physics - Aug. 1877

p. 709 & 710.

Roschell's Physics - Aug. 1877

Section 371.

Appr No. 205

Appl^s filed March 20, 1880

Rejected May 1, "

Letter from office " 18, "

Amended June 1, "

Appeal to Comm^r " 1 "Hearing before Comm^r " 21 "

Decision on appeal " 25 "

(Examiner reversed as to 1st claim,affirmed as to 2nd)

Amended & argued July 9, 1881

Rejected July 20, 1881

Additional affid^s Oct 10th 1882.Re-recommending requested Jan 7th 1883.Rejected June 14th "

Assignment dated January 13, 1881

" records

Liber

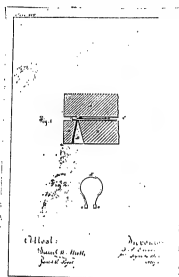
Manufacture of Chlorine Water
(Edison Bros. Mfg. Co.)

App. No. 215

9

Filed May 24, 1880
 Rejected, June 25, 1880
 Amended April 25, 1881
 Rejected May 21, 1881
 Argued June 13, 1881
 Rejected July 20, 1881
 Amended & argued, July 26, 1881
 Letter fr. Office Aug. 24, "
 Amended & argued Oct. 5, "
 Rejected " 25, "
 Argued Jan. 7, 1882
 Rejected Feb. 1, "
 " April 25, "
 See opposite page.

Application assigned to
 Assignment dated June 21, 1881
 " recorded " 24, "
 Door C-36 p. 222



Manufacturing Carbons for Electric Lamps.

Claims

Original assignment in paper.

Paraphrased

1. The method of forming carbons for electric lamps, which consists in cutting or stamping from a sheet, a piece of wood with thickened or broadened ends, and of the shape desired, and then carbonizing the same substantially as described.
2. The method of forming carbons for electric lamps which consists in forcing the wood into the shape desired for the carbon, and then carbonizing the same substantially as described.

Rejected as an ordinary and well known method.
 See Eng. Patent 5127 of 1879

Amended & argued March 30, 1882
 Rejected April 25, "
 Written argument reff. May 2, "
 Rejected May 25, "
 Additional effort Oct. 10, "

27

Filed, May 31, 1880

Rejected June 11, "

Letter to Office, June 24, 1880

" from " 30, "

Argument, July 1, 1880

Letter from Office July 8, 1880

Interference declared
with Keith & Brush

Aug. 27, 1880

Preliminary Statement filed

Sept. 27, 1880

Amended November 21, 1881/1.

Additional affid. Oct 10th 1882 one or a battery of Magneto or dynamo electric machs.Invented by regulating the current passing through the
field of force magnets, substantially as set forth.

Application assigned to Co.

Assignment dated June 21, 1881

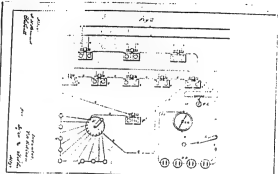
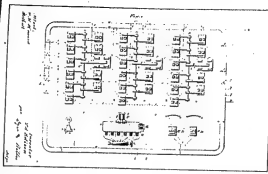
" recorded " 24, "

Lib. 2²⁶ p. 222.

Original assignment in safe.

App. No. 27.

3



Magneto or Dynamo Electric Machines

1. The method of regulating the generating capacity of one or a battery of Magneto or dynamo electric machines, by regulating the current passing through the field of force magnets, substantially as set forth.
2. A Magneto or Dynamo electric machine constructed or combined with suitable devices for primarily varying the strength of the current exciting the field of force magnets.
3. In a Magneto or Dynamo electric machine, the combination with one or more of the exciting or field of force magnets, of an adjustable resistance, substantially as and for the purposes set forth.

App^{re} No. 218

Filed June 3, 1880

Rejected June 31, 1880

Letter from Office in re
Prospective Interference.

July 12, 1881

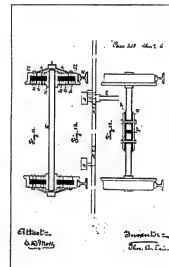
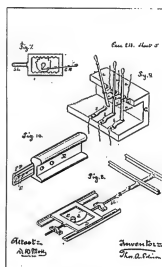
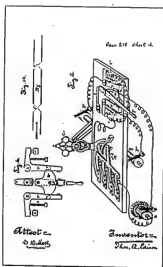
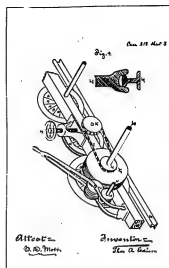
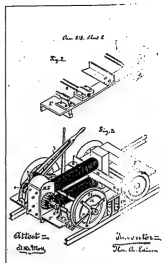
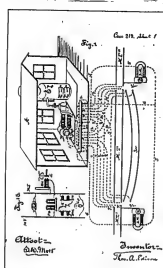
" " 20 "

Amended " 26 "

Letter from Office Aug. 1881

(not dated)

Argued & Amended, May 20, 1882

Additional affid^{its} Oct. 10 - 1882Interference declared with
Siemens & Field, Aug. 6, 1881

Electro Magnetic Rail-Roading

1. A system of electrical rail-roading, in which a road is divided into electrical sections, the rails forming the conductors, each section provided with a central station, at which are located a suitable engine, a generator of electricity, and means for controlling and completing the circuits to trains and to switches, cars which are electrically divided, so that the motors therein, are insulated from the track, and means for completing the circuit from line to line of rails through the motor, substantially as set forth.

2^d claims rejected on
Principals, No. 91, 732
June 22, 1867

5th claim

rejected on technical objection

6th claim

same, 68, 880
April 2, 1867

8th claim

Revised, 155, 433, Sep. 29, 74

9th claim

Revised, 155, 433, Sep. 29, 74
Eng. Patent 3335 of 1875

10th claim

Convey, 137, 421, April 1, 78

11th claim

Eng. Patent 13, 267 - Old Law

2. The combination with a track switch, of an electric motor and circuit for operating the switch, substantially as set forth.
3. The combination with a car frame insulated from the track, of an electric motor, an electric braking device, and clamps, or of any two of them, when they are arranged on multiple arc or derived circuits, substantially as set forth.
4. The combination with a car frame, of an electric engine for activating the car, and having its inducing and field of force magnets in separate derived or multiple arc circuits, substantially as set forth.
5. The combination with an electric engine mounted upon and activating a car, of a circuit mirror, and means for operating the mirror from a distant station, substantially as set forth.
6. The combination with an electric engine mounted upon and activating a car, and the main driving axle, of a governor receiving motion from the latter, and operating to break the circuit of the engine upon the attainment of a predetermined rate of speed, substantially as set forth.
7. The combination with a main electrically connected rail section, of a short section, connected to the main section by conductors arranged to change the polarity of the current traversing each line of rails, substantially as set forth.
8. A car wheel constructed of a metallic hub and a metallic center, united by a wooden or insulating web, substantially as set forth.
9. A car wheel in which an insulation is so applied that the body is electrically insulated from the flanges of the wheels, substantially as set forth.
10. The combination with an electric engine mounted upon and activating a car, and the main driving axle, of a loose or flexible connection for conveying motion from one to the other, substantially as set forth.
11. The combination with a car, of a magnet or magnets operating upon closure of circuit, to increase the traction of the car upon the track, by their magnetic influences, substantially as set forth.

(See next page)

App^y No. 218 (continued)

12. The combinations with the insulated flange, and the contact spring for conveying the current therefrom of several multiples are circuit, each containing a device used in running, controlling and or lighting the car, substantially as set forth.

13th claim
Boothcut

Oct. 25, '49

13. The combinations with a car, of an additional gear faced wheel mounted in an adjustable frame, means for elevating or depressing the wheel and its frame, and a loose or flexible connection therefrom, to the main driving axle, substantially as set forth.

14. The combinations of a loose friction pulley on the main driving axle, a friction pulley on the motor shaft, and a swinging or movable pulley for connecting the two, a sprocket wheel on the loose pulley, a sprocket wheel on the shaft of the ground wheel, and a sprocket chain, substantially as set forth.

15. The combinations with the operating lever of a circuit narrow, of a cam plate normally holding the swinging lever of the narrow out of contact with their contacts, and always opening one circuit before closing another, substantially as set forth.

16th claim
Technical suggestions

16. The combinations upon one car, of an electric engine for actuating the car, a circuit narrow, a centrifugal governor acting to make or break the circuit, and a magnet or magnets operating to increase the traction of the car upon the track, substantially as set forth.

17th claim
Boothcut,
Ketchum

Oct. 25, '49

Mich. 20, '59

17. The combinations with main driving and ordinary wheels of a car, of a wheel adapted to grasp the track and to be brought into operation as desired, substantially as described.

18. The combinations of the main track sections, the sections MT and SW, and circuit connections and switch motors, whereby trains may be passed by each other, substantially as set forth.

Filed Aug. 17, 1880

Rejected, Sept 3, 1880

Amended & Argued June 1, 1881

Revised " " "

Verbal interview of Major Wilber
with Examiner presiding case
June 13, 1881.

Appⁿ No. 256

(No Drawing)

Process of Treating Auriferous Sulphurets

claim.

The method of treating so-called auriferous sulphurets, which consists in reducing them to powder, and then subjecting the resulting material (either raw or waste) to the action of a magnetic separator, substantially as herein set forth.

rejected on
Eng. patent 1565 of '79

Filed, Aug. 9, 1880

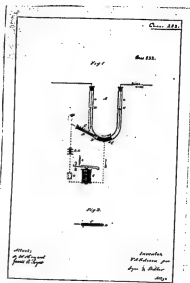
Rejected " 14 "

Revised, Sept. 11th 1882.

Rejected " 25 "

Adm'd. Office Oct 10

App't No. 232



Telegraph Relay.

Claims.

both claims rejected on
Eng. patent No. 2771 of 1875.

1. The combination with a main line circuit, and a local circuit, of a mobile conductor interposed in the main line circuit, and operating to control the local circuit, substantially as set forth.
2. A relay in which the movement of a mobile conductor controls the local circuit, substantially as set forth.

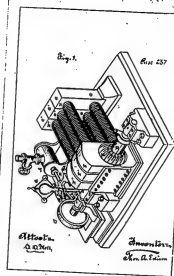
Filed, Aug. 9, 1880

Rejected, Oct. 11, 1880

Re-examined Oct. 7th 1882

Att'd. aff'd " 10 "

Rejected " 12 "

App^y No. 237

Application assigned to Co.

Assignment dated June 21, 1881

Recorded " 24 "

Lib. 2nd page 222

Dynamo or Magneto Electric Machines.

Original assignment in paper.

1st claim

Comptroller, 10, 175, Nov. 1, 1883

3^d claim

Eng. patent 2628 of 57

3^d claim

Eng. patent 3006 of 63 (page 8)

4th claim

Lottin & d'Armaist

74, 014, Aug. 24, 1869

Claims.

1. A magneto or dynamo electric machine consisting of a series (two or more) of independent field of force magnets and a single armature or bobbin common to them all, substantially as set forth.
2. The combination of a magneto or dynamo electric machine, a steam engine connected thereto, by a counter balanced connection, a governor and variable cut off, automatically controlled thereby, and an armature or bobbin serving both as an armature or bobbin, and as a fly or balance wheel, substantially as set forth.
3. The combination with a common base, of an automatically controlled steam engine, a magneto or dynamo electric machine, and non magnetic supports placed between the generator and the base, substantially as set forth.
4. The combination with the polar extensions of a series of independent electro magnets, forming with a bobbin common to them all, a generator of a non-magnetic plate or brace uniting and supporting the polar extensions; substantially as set forth.

5-4 claims

Eng. patent 2628 of '57

5. The combination of a generator, a high speed steam engine, and a variable cut off and governor, so that the speed of the engine, and the force or pressure of current are automatically regulated, substantially as set forth

Filed, Aug. 17, 1880

(informal) (complete) Aug 27)

Rejected Sept. 3, 1880

Amended, April 25, 1881

Rejected " 30 "

Argued July 9, 1881

Rejection " 19. "

Amended & argued July 21, 1881

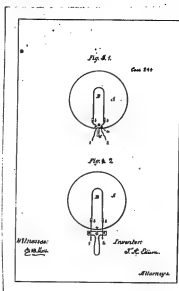
Rejected " 23, - "

Amended " 27, 1882

Rejected Aug. 24, "

Added to affid Oct. 10, "

App^o No. 244



Electric Lamp.

Application assigned to Co.

Assignment dated June 21, 1881

" Recorded " 24 "

Lib^r 2⁶ page 222

Original assignment in safe.

rejected as

" objectionable in form "

reference to Eng. patent

2442 (Cadmium) and

Eng. patent 9,053, O. S.

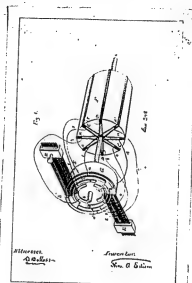
claim.

The electric lamp consisting of a sphere or containing chamber entirely of glass, an incandescing condenser, and protruding conductors leading thereto, and sealed into the glass of the sphere where they pass therethrough, by a welding or union of the glass thereto, substantially as set forth.

Filed Oct. 30, 1880
 Rejected Dec. 28, "
 Additional, off't Oct 10, 1882.
 Re-ex reg'd Dec 15, "
 Rejected " 22, "

App^o No. 248

3



Commutator.

Application assigned to Company
 assignment dated June 21, 1881
 " recorded " 24, "
 Lib'n 2³⁶ p. 222

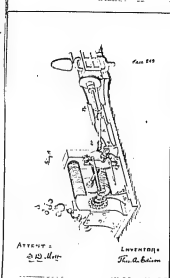
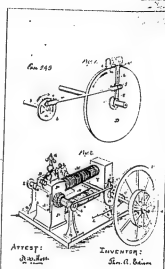
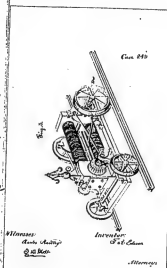
Original assignment in safe.

Claims required on
 Brush, 157,997 of April 24, 1887

Claims.

1. A commutator having elongated metallic conductors, arranged in shelves, in such relation to each other that nearly all are in contact with the brushes during the period of rotation, substantially as set forth.
2. The combination with a rotating armature such as shown, operating to obtain in circuit constantly all the coils excepting the one in the neutral line, substantially as set forth.
3. The combination with a rotating armature, of a commutator, such as described, operating to connect in multiple arc, all the coils, except the one in the neutral line, substantially as set forth.

Filed, Oct. 1, 1880
 (complete Oct. 7, ")
 Rejected Dec. 10, 1880
 Sent to Office Dec. 10, 80
 Rejected Dec. 15, 1880
 Amended & argued July 21, 1881
 Rejected July 22, 1881.
 Amended & argued October 5, 1881
 Rejected " 12, "
 Amended & argued May 20, 1882
 Additional affd filed " 19, "
 Rejected " 27, "
 Additional affd Oct. 10, "

Appⁿ No. 249

Electro Magnetic Engines

Claims

1. The method of inducing speed between an electric engine and the machinery driven thereby, by first converting the rotary motion of the armature into oscillating motion and then re-converting the oscillating motion into rotary motion, substantially as set forth.
2. The combination with the rotary armature of an electric engine, of an oscillating pawl carrier, and a friction wheel actuated thereby substantially as set forth.
3. The combination of a rotating armature, an oscillating pawl carrier, a pinion and an adjustable connection, so that the throw and speed of the pawl carrier may be varied, substantially as set forth.
4. The combination of a rotating armature, an adjustable driver pawl carrier, an adjustable connection between them, and means for determining which pawl shall be kept in operation at any one time, substantially as set forth.
5. The combination of an electric engine, a machine driven thereby, and a pinion for connecting the two directly without the intervention of gearing or belts, substantially as set forth.

Claims 1 rejected on patent of
 Bartholomew 17,823; July 21, 87
 Woodward 209,439 Oct. 29, 78

Claim 2, same reference

Claim 3, do.

Claim 5, the same, and
 also - Gray - 190,206 - May 1, 77
 Dupan 93,689 - Aug. 17, 69

To be assigned

Filed, Oct. 6, 1880
(Complete "12.")

Rejected, Dec. 17, 1880

Amended, Jan. 27, 1881

Rejected " 27, "

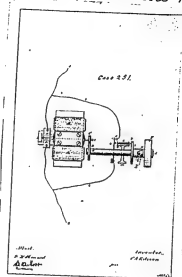
Prospective Interferences

May 16, 1881

Letter to Office May 25, 1881

Letter from Office May 25, 1881

App^o No 257 (P. A. Edison & C. N. Johnson)



Dynamo or Magneto Electric Machines.

Claims

1. The combination with a main circuit and a magneto or dynamo electric machine, of a shunt or short circuit around the machine, and means for automatically controlling and breaking such short circuit immediately upon and continuously during the operation of the machine, substantially as shown.
2. The combination of the driving shaft of a dynamo or magneto electric machine, a shear mounted thereon in such manner as to have a detentiate longitudinal movement thereon, and a circuit breaker automatically operated by the longitudinal movement of the shear, substantially as set forth.

Formal objections to 1st claim
can be held up for further
-ference.

App^y No. 253

3

Filed, Oct. 30, 1880

Rejected, Dec. 28,

Amended & signed July 21, 1881

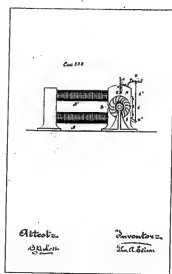
Rejected " 23, "

Added, affidavit Oct. 10, 1882

Intro, spec^y, drawing 2nd

added, oath July 17, 1882

Rejected " 24, "



Application assigned to Company

Assignment dated June 21, 1881

" recorded " 24, "

Lib^r C²⁴ p. 222

Original assignment in safe.

Magnet or Dynamo Electric Machine.

Claims.

1st claim
 common appts of transmission
 to boilers, chimneys &c

Claim 2
 refers to Shaffner's Polygraph
 Manual, May 37, p. 125, fig. 18.

3^d claim
 aggregation

App^y said to corr
 two separate inventions

1. The combination with an electric engine, or a magnet or dynamo electric machine, of means for constantly indicating its thermal condition, substantially as set forth.
2. The combination with an electric engine or a magnet or dynamo electric machine, of means for constantly indicating its magnetic condition, substantially as set forth.
3. The combination with an electric engine, or a magnet or dynamo electric machine, of means for constantly indicating its thermal, and its magnetic condition, substantially as set forth.

Filed Oct. 30, 1880
 Rejected, Nov. 29, "
 Amended, " " "
 Rejected, Jan. 3, 1881
 Amended, " 26, "
 Rejected, Feb. 14, "
 Rejected Aug. 8, 1882.
 Additional affid. Oct-10 "

Appr. No. 259

No Drawing!

Manufacture of Carbon.

Claims.

1. The method of forming carbon articles of a definite desired shape, consisting in cutting or shaping the articles from paper and then carbonizing the shaped paper, substantially as set forth.
2. The method of forming carbon articles of a definite desired shape, consisting in cutting or shaping the articles from paper, and then carbonizing the shaped paper, while under pressure or strain, substantially as set forth.
3. As a new article of manufacture, flexible carbon in sheets, or in definitely shaped articles formed from sheets of carbonizable material, substantially as set forth.

Application assigned to Company
 Assignment dated June 21, 1881
 " Recorded " 24, "
 Liber X²⁵ p. 222

Original assignment in copy.

Claims rejected on refer-
 ences as follows.

Riggs on Elec. Light. Reg. 1879
 page 238.

Eng. patent 3,352 of '76, line 50
 " 861 " 78

"The Electrician" of Oct. 30, '80
 (written by Justman) page 250.

Patent of Maxims - 230, 309 -

July 20, 1880

" " Sawyer - 224, 612 -

Feb. 17, 1880

Filed, Nov. 24, 1880

Rejected Dec. 10, "

Rejection Interferenced

April 26, 1881

Amended May 14, "

Dec. of Interference, with

V. S. Maxson, May 21, 1881.

Dec. of Interference (Case A)

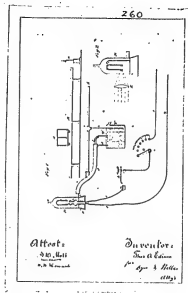
with V. S. Maxson

Aug. 13, 1881

Additional affidavit Oct. 10, 1882.

App. No. 260

9



Method of Equalizing the Resistance of Carbons

Application assigned to Company

Assignment dated June 21, 1881

" Recorded " 24, "

Lib. 2²⁶ page 222

Original assignment in safe.

Claims.

1. The method of equalizing the resistance of carbons for use as incandescent conductors for electric lamps, herein described, consisting in heating by a current the shaped carbonized conductors in a vessel through which passes a flow of carbon vapor, substantially as herein described.
2. The method of treating carbons for use as incandescent conductors in electric lamps, which consists in placing the shaped carbonized conductors in a stream of carbon vapor, and subjecting them to the action of a current, such as embodied they shall be used with, substantially as set forth.
3. The combination of an electric circuit, a carbon holder, a receiver for enclosing such holder, and arranged to be provided with an atmosphere of hydrocarbon or equivalent gas for building up the carbon and changing its resistance, a standard light, and a photometer, substantially as and for the purpose set forth.

Filed, December 15, 1880.
 Rejected, February 10, 1881.
 Amended & argued April 3, 1882.
 Rejected April 10, 1882.
 Amended & argued May 16, 1882.
 " " " 23, "

Oral argument " 22, "
 Rejected . . . June 1, "
 Amended & argued " 12, "
 Rejected July 3, "
 Amended & argued " 28, "
 Amended Aug. 19, "
 Amended " 23, "
 Admitted, offit Oct. 10, "
 Amended July 13, 1882

See opposite page 1.

Application assigned to Company
 Assignment dated June 21, 1881
 " recorded " 24, "
 Libor T. 26 p. 222.

Original assignment in paper.

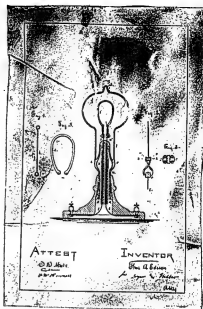
Appⁿ No. 264
 (No Drawing)

Incandescent Electric Lamps.

Claims.

1. An incandescing conductor for an electric lamp, consisting of a filament of carbon of relatively high resistance, substantially as hereinbefore set forth.
2. An incandescing conductor for an electric lamp consisting of a filament of flexible carbon, substantially as set forth.
3. An incandescing conductor for an electric lamp, consisting of a filament of relatively high resistance and flexible carbon, substantially as herein set forth.
4. An electric lamp for giving light by incandescence consisting of a filament of high resistance and flexible carbon hermetically sealed within an enclosing globe made entirely of glass, substantially as herein set forth.
5. The combination of flexible carbon filaments of high resistance, an exhausted enclosing globe made entirely of glass, and conductors passing through and sealed into the glass, substantially as hereinbefore set forth.
6. A carbon for electric lights made as a filament with broadened or enlarged clamping ends, substantially as hereinbefore set forth.
7. The clamps composed of a bow or elliptical spring with the ends crossing each other, and receiving between them the carbon, substantially as hereinbefore set forth.
- 8.

Rejected March 24, 1883.
 Applied to Board June 11, "
 Rejected July 6, "
 Appeal withdrawn " 11, "
 Rejected Aug 10, "
 Appeal reinstated Oct 12, "
 Rejected " 15, "



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the lamp.
 below, sub-

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now filament
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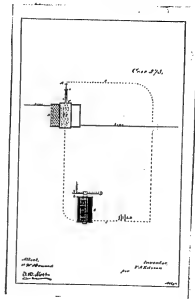
Filed, Dec. 14, 1880

Rejected Jan 3, 1881

(working model required)

Additional effort Oct. 10 1882

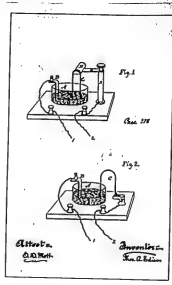
App# No. 273.



Telegraph Apparatus.

Claims

1. A magnet having a hollow iron core filled with a conducting liquid, substantially as, and for the purpose described.
2. The combination of a magnet having its hollow core filled with a conducting liquid, with a local circuit and contact point arranged so that the condition of the local circuit depends upon the electrical condition of the main circuit, substantially as described.

App^y No. 278

Filed, Jan. 11, 1880.
 Rejected, Feb. 17, "
 Additional effort Oct 10, 1880.
 Amended Jan. 26, 1881.
 Rejected Feb. 13, "
 Amended July 10, "
 Rejected Aug. 14, "

Application assigned to E. E. Co.
 Assignment dated June 21, 1881
 " recorded " 24, "
 Lib. 2⁶ p. 222.

Original assignment in safe.

rejected on
 Farmer - 213, 643 - Mich. 25, 77

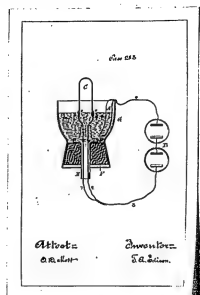
claim.

A carbon for the incandescent conductor of
 an electric lamp, having plated ends for clamp-
 ing substantially as set forth

Filed, Jan. 17, 1881
 Rejected, Dec. 27, "
 Div^{ns} of Interferer
 (Station) April 20, 1881
 G. Weston added to Div^{ns}
 May 9, 1881
 Additional office Oct. 10th, 1882

Appⁿ No. 283

5



Electric Lamp and the Manufacture thereof.

Application assigned to E.E.C. Co.
 Assignment dated June 21, 1881.
 " recorded " 24 "
 Lib^{ry} C² p. 222.

Original assignment in safe.

both claims
 in Interferer with
 approval of L. W. Eastman.
 G. Weston.

Claims

1. The method of uniting the carbon filament and conducting wire leads, in an electric lamp, consisting in first uniting them mechanically in any ordinary manner, and then securing the union by electroplating therein, substantially as set forth.
2. The combination of a carbon filament, and the conducting wire leading thereto, united by an electro-plated union or joint, substantially as set forth.

Filed, Feb. 28, 1881

Rejected Apr 15, "

Amended & argued October 12, 1881

Rejected Nov 17, "

Add'l. effort Octob 10, 1882

Ref'd to office Nov. 8, 1883

Rejected July 20, 1884

App^{or} No. 290
(No Drawing)

9

Application assigned to E. E. L. Co.

Assignment dated June 21, 1881

" recorded " 24 "

Lib^{er} Xth p. 222

Original assignment in reffo.

Carbons for Electric Lamps.

Claim 1 rejected on Pouchin's
objec^t. pages 132, Vol. 1, Ed. 1857

Claim 2

Eng. patent 3,164 of 57

Claims 3 & 4

Eng. patent 14,198 of 1852

Claims 5 & 6

Patent - 213,643 - Mch 25, 177

1. The method of manufacturing incandescing conductors of graphite or plumbago, consisting in pressing the carbon into sheets, and then cutting or stamping the conductors therefrom, substantially as set forth.
2. The method of manufacturing incandescing conductors from graphite or plumbago, consisting in forming them from powdered, graphitic graphite or plumbago carbon by pressing, substantially as set forth.
3. An incandescing conductor for electric lamps formed of graphite or plumbago, substantially as set forth.
4. An incandescing conductor for electric lamps, formed of graphite or plumbago, flexible and of relatively high resistances, substantially as set forth.
5. An incandescing conductor for electric lamps formed of graphite or plumbago as described, and provided with plated ends, substantially as set forth.
6. The combination of an incandescing conductor of graphite or plumbago, and its conducting wires, united thereto by a plated connection, substantially as set forth.

Claim 7
 Eng. Pat. 3807 of 1875

7. An insulating conductor formed of compressed graphite or plumbago, and having enlarged ends for clamping, integral therewith, substantially as set forth.

Drawing and
 Specimens required.

Filed May 27, 1881

Rejected June 13, 1881

Journal des inventions in

view of Edison's patent #223,898

+ Comptes Rendus, Vol 70, p. 666.

Acquiesced July 13, 1881

Rejection " 18 "

Letter to office " 20 "

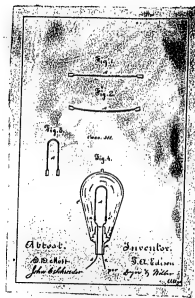
" from " Aug. 24 "

Interference declared with

Edison and Swan, Oct. 1, 1881.

Admitted official. Oct. 10, 1882.

Application No. 311.



Electric Lamp

Claims.

Application assigned to E. E. C.

Assignment dated Sept. 21, 1881

" recorded " 28, "

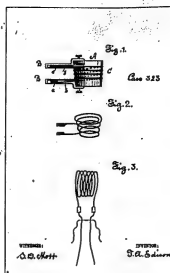
Lib. Z⁴ p. 338.

First. In an incandescing electric light, a carbon formed from a straight strip of card-board, paper or parchment paper, and bent to the form of an arch, loop or loop and carbonized by heat, while in a bent condition and under stress, substantially as set forth.

Second. A carbon for an electric lamp made of the carbonized parchment-paper.

Filed June 24, 1881.
 Rejected Aug. 15, "
 Amended & argued Sept. 15, 1881
 Rejected September 20, 1881
 Amended & argued Oct. 13, 1881
 Rejected " 21, "
 Argued Apr. 3, 1882
 Rejected " 10, "
 Withdrawn of a. Aug 2nd "
 Special " 14th "
 Add Appeal Oct 10th "
 Amended April 9, 1884.
 Rejected " 17, "

Application No 323



Carbons for Incandescent Electric Lamps.

Application assigned to E. E. L. C.

Assignment dated Sept. 21, 1881

" recorded " 28, "

Lib. X 36 p. 338.

Claims.

First. An incandescing conductor for electric lamps, consisting of a carbonized natural fiber of open spiral shape, substantially as set forth.

Second. An incandescing conductor for electric lamps, consisting of a filament of carbon formed as an open conical spiral, substantially as set forth.

Third. A form for carbonizing consisting of a conical block, around which the carbon is wound spirally, substantially as set forth.

Fourth. In a form for carbonizing the combination of the conical block, the removable grooved arms, and the sliding friction blocks or weights, substantially as set forth.

Application No 330

Filed June 22, 1881.

Rejected August 15, 1881

Amended & argued Sep. 13, 1881

Rejected September 20, 1881

Amended & argued Sept. 27, 1881

Allowed but suspended until after
interference decided - Sep. 29, 1881Letter to office Nov. 15, 1881
asking for revocation of
suspension.

Argument December 5, 1881.

Letter from Office Decr 13, "

Appeal to Commissioner Apr. 10, 1882

Hearing on appeal fixed for " 19, "

Oral argument before Commr " 26, "

Brief filed " " "

Decision affirming Examiner May 9, "

Gen. power of A. August 2, 1882

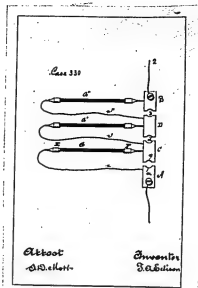
Special " " 14 "

Add'l Appeal October 16, "

Application assigned to E. C. C.

Assignment dated Sept 21, 1881

" recorded " 28, "

Liber 2^d p. 338.Rheostats.Claims.First. A rheostat in which the resisting portions are of carbon, substantially as set forth.Second. The combination in an electric circuit of a carbon portion, and a metallic portion, united together by electro-plating the point of union, substantially as set forth.Third. The method of uniting carbon with metallic conductors, consisting in electro-plating the point of union between them.Fourth. In a rheostat, the combination of a series of metallic conductors, and a series of carbon resistances all united together by electro-plated unions or joints, substantially as set forth.

Application n° 332.Filed June 24th, 1881.

Amended & argued April 10, 1882.

Rejected.

Entered interlocutory appeal to Commr.

from Commr. April 24, 1882.

Renewed appeal May 4, "

Interlocutory appeal to Commr. forth.

to May 24, 1882.

Ex parte P.O.F. Aug 2 1882.

Special " 11. "

Add'l Aff'd Oct 10 "

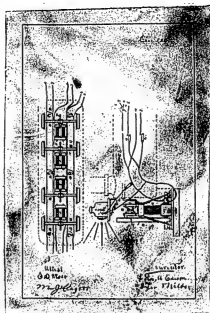
Hearing Dec 30. "

Examiners decision aff'd.

Furnish by Commr. Jan 1883.

Amended February 1883.

Repealed March 8. "

Application assigned to E. C. L. C.

Assignment dated Sept 21, 1881.

" recorded " 28. "

See Xth p. 338.Electrical Systems for Railroad Trains.Claims.

First. In a steam railroad train, an electrical system consisting of a dynamo or magneto electric machine, one or more circuits throughout the train, transmitting devices connected in multiples and with said circuit or circuits, and a steam engine for driving said electrical generator, supplied with steam from the locomotive boiler and operating independent of the movement of the train, substantially as set forth.

Second. In a steam railroad train the combination of the electrical generator, an independent steam engine supplied with steam from the locomotive boiler, and driving the generator and a lamp circuit throughout the train having incandescing lamps connected therewith in multiples and, substantially as set forth.

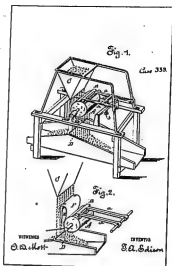
Third. In a steam railroad train, the combination of the electrical generator the independent steam engine supplied with steam from the locomotive boiler, a brake circuit throughout the train, electro magnets connected in multiples and with said brake circuit, and discs revolved by the movement of the train between the poles extensions of said magnets, substantially as set forth.

Fourth. The combination with a railroad locomotive of an electrical generator, an independent steam engine supplied with steam from the locomotive boiler, and the locomotive head-light composed of a reflector and one or more incandescing

Lamps connected in multiples are with a circuit from the generator, substantially as set forth.

Filed August 25th 1912
Replied September 7th 1912
Made Apph Oct. 11th 1912

Application No 339.



One Separator.

Claims.

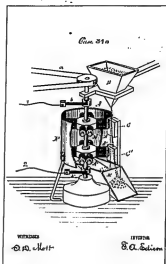
First. The method of separating mixed conductors and non-conductors of electricity, independent of their magnetic properties, consisting in allowing them to fall together and then changing the trajectory of the falling conducting substance without stopping its fall by inductively changing and attracting the same, substantially as set forth.

Second. The combination of a copper and an electrically charged body when arranged relatively to each other, as hereinbefore set forth.

Third. The revolving cylinder and the friction pad for generating frictional electricity, in combination with the copper, and the dividing partition arranged relatively as hereinbefore set forth.

Filed August 25 '12
Replied Sept 7 '12
Addr App'd Oct 10 '12

Application No. 340.



Ore Separators.

Claims.

First. The method of separating mingled conductors and non-conductors of electricity independent of their magnetic properties, consisting in allowing same to fall together through a magnetic field, and changing the trajectory of the falling conducting substances without stopping its fall by shifting the lines of magnetic force, such substantially as set forth.

Second. The combination of a hopper and a magnetic field, the lines of force of which are constantly shifting, the parts being arranged relatively, substantially as set forth.

Third. The combination of two revolving electro-magnets, the armatures and the hopper arranged relatively, substantially as set forth.

Fourth. The combination of two revolving electro-magnets, the rotating cylinders, the armatures and the hopper, substantially as set forth.

Filed October 8th, 1881

(Informal; drawing required).

Amended and drawing filed Nov. 15/81

Letter from Office December 21, 1881

Rejected December 29, 1881.

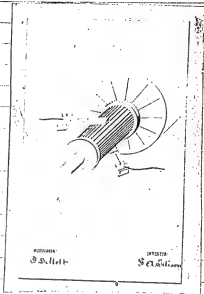
Genl Power Atty. to R. N. Dyer filed Aug. 2, 1882.

Special 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044

Additional affidavit ... Oct 10, ...

Amended Jan'y, 21/1884

Rejected. 17 " 25 "



Application assigned to E. E. L. C.

Assignment dated May 1, 1882.

U.S. GOVERNMENT PRINTING OFFICE: 1963 O 352-088

Lib. B³⁶ page 148.

Commutators for Dynamo or Magneto Electric Machines.

blains.

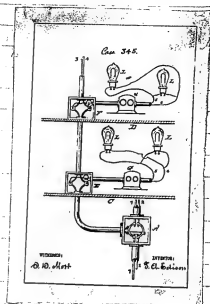
First The method of reducing the resistance of moving surface contacts, consisting in amalgamating the contacting surfaces, substantially as set forth.

Second. The method of reducing the sparks at the commutator of a dynamo or magneto electric machine consisting in arranging the contacting surfaces of the commutator and the brushes, substantially as set forth.

Third. The combination of a commutator and its brushes, strips, wheels or other collectors, having amalgamated contacting surfaces, substantially as set forth.

Filed October 14th 1881.
 Rejected Nov 17th "
 Pat. Tower Mfg Co. N.Y. for floor Aug 2, 1882
 Grant " " " " " 114, "
 Additional appl filed Oct 10, "
 Selling to Office Nov 13, 1883
 Rejected " 19, "

Application No 345



Electrical Distribution Systems.

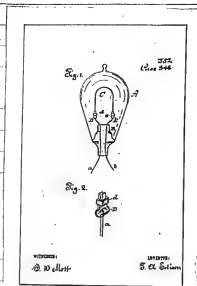
Claims.

First. In a system of electrical distribution, the combination with the main conductors and house service box located in the street, of the house conductors running vertically through the house, a service box on each floor through which said vertical conductors pass, and separate meters for independently measuring the current furnished each floor or each consumer within the building, substantially as

Second. In a system of electrical distribution, the combination with the conductors running through the house and floor service boxes of the floor wires or conductors transmitting devices arranged in multiple arc or cross circuits, and a meter and safety catch for each floor, or for each consumer within the building, substantially as set forth.

Application No 352

Filed November 11, 1881
 Rejected December 14, "
 Gov. Tower Atty. Gen. Dyer Aug. 2, 1882
 Special " " " 14, "
 Amended & new drawing filed Sept. 7 "
 Rejected Sept. 13, "
 Additional appl. filed Oct. 10, "

Incandescent Electric Lamps.Claims.

In an incandescent electric lamp the combination with the incandescing conductor of tapered spring clamps and bands for tightening the clamps, substantially as set forth.

Application No 365

Filed November 28, 1881
 Rejected January 6, 1882
 Paid Lower Atty. to C. M. Byor Aug 2, 1882
 Specie " " " 14, "
 Additional affidavit filed Oct 10, "
 Amended Nov 21st 1882
 Rejected Jan'y 29th 1883

Thermo-Electric Batteries

Claims.

First. In thermo-electric batteries an active electrode having a galvanic deposited metal plates directly thereon for reducing the resistance, substantially as set forth.

Second. In thermo-electric batteries the plates of carbon or an active sulphide, tellurium or selenium in combination with metal deposited on each side of said plates by galvanic action, or in any analogous manner, substantially as set forth.

Application No 367.

Filed November 28, 1881.
 Rejected December 28, "
 Car. Comm. atty. to R. N. Dyer Aug 2, 1882.
 Filed " " 14, "
 Additional off. filed Oct 10, "
 Letter to office Dec 12, 1883.
 Rejected " 17, "

Means for Operating E. L. Apparatus
 Running from Multiple Arc System.

Claims

First. In a multiple arc system of lighting by electrical incandescence a shunt from one of the multiple arc or derived circuits for operating electrical apparatus, substantially as set forth.

Second. The combination with a multiple arc or derived circuit of a system of lighting by electrical incandescence of an incandescing lamp or other resistance placed thereon, and a shunt therefrom, containing electrical apparatus, substantially as set forth.

Application No. 370.

Filed November 28, 1881
Letter from Office Jan'y 6, 1882
Amended " Feb 28, "
Letter from Office March 4, "
Amended " 8, "
Letter from Office " 10, "
Genl. Power Atty to R. H. Byer Aug 2, 1882
Effect " " " " 14, "
Additional appl. filed Oct 10, "
Amended " Nov 7, 1882
Rejected " 18, "

Arc Lights.

Claims.

First. The combination of a number of voltaic arc lamps arranged in multiple arc or derived circuits being completed only through the electrodes of the lamps, substantially as set forth.

Second. The combination with a voltaic arc lamp located in a multiple arc or derived circuit, of a regulating mechanism controlled by opposing solenoids or electro-magnets, arranged respectively in one of the main conductors and in the derived lamp circuit, substantially as set forth.

Third. A voltaic arc lamp having opposing solenoids or electro-magnets of the same or approximately the same resistance for controlling the regulating mechanism, substantially as set forth.

Application No 373.

Filed November 29, 1881
 Rejected June 14, 1882
 Amended & new drawing filed July 17, "
 Rejected " 26, "
 Got Power of Atty to R. N. Dyer Aug 2, "
 Quot " " 14, "
 Additional appl. filed Oct. 10, "

Systems of Electric Lighting
 System for Arc and Incandescent Lights.

Claims.

First. A system of electric lighting containing arc and incandescent electric lamps, substantially as set forth.

Second. The combination of arc and incandescent lamps arranged in the same system and supplied from the same source of electrical energy, substantially as set forth.

Application No 378

Filed August 7, 1882
 Rejected " 24, "
 Adm. off. recd. Oct. 10, "

Incom. Cl. file

Incandescing Electric Lamps

Claims

1. In an incandescing electric lamp, the combination with the two limbs of the carbon of a central wire sealed in the bottom of the globe, and connected to the center of the carbon push or loop, substantially as set forth.
2. In an incandescing electric lamp, an arch or loop of carbon so arranged and connected that the two sides of the carbon may be used together in series, or in multiple arc, or either may be used separately, substantially as set forth.
3. In an incandescing electric lamp an incandescing conductor formed of two straight pieces of carbon joined at the top by a wire in combination with a wire passing vertically between said carbons and attached to the wire joining them, substantially as and for the purpose set forth.

379

Filed December 9, 1881.
 Rejected January 6, 1882.
 Continued app. to R. N. Dyer Aug. 2, "
 Serial " " " 14, "
 Adm. off. filed October 10 "
 Amended Dec. 15, 1882.
 Rejected " 15, "

Application No. 379.

Inventor E. E. Lys.

Incandescing Electric Lamps

Claims

1. In an incandescing electric lamp the combination of two carbons placed one within the other for reducing their effective radiating surface and increasing the electrical resistance substantially as set forth.
2. In an incandescing electric lamp the combination of two or more spiral carbons conductors, connected in series, the coils of one covering and partially hiding those of the others, substantially as and for the purpose set forth.

384

Application No. 384

Filed August 7, 1882.

Rejected " 24, "

Adopted after October 10 "

Greg E. Lys

Incandescing Electric Lamps

Claims

1. An incandescing electric lamp having a portion of its enclosing globe constructed to act as a reflector, substantially as set forth.

Filed . . . August 7, 1882.
 Rejected . . . Sept. 19.
 Adm. off. filed Oct. 10.

Application No. 401

Wm. G. Carter, Jr., of

Manufacturing Carbons for Electric Lamps

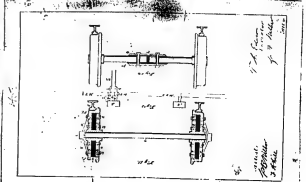
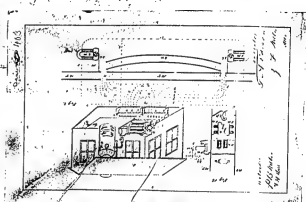
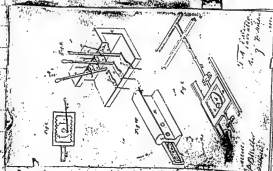
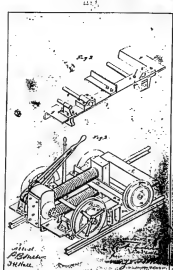
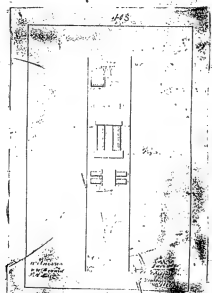
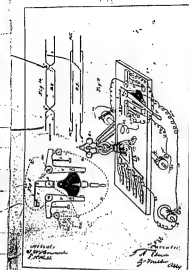
Claims.

1. The method of forming a slip or filament for carbonization, consisting in securing a blank in clamps or holders having the configuration desired for the carbon, and shaving or cutting away the superfluous material, substantially as set forth.
2. In a device for shaving ^{slicing or} fibres in which the fibre is drawn against a stationary knife or cutting blade, the combination of such stationary knife or ~~cutting~~ blade with the movable block and adjustable limiting screw, substantially as set forth.
3. The clamp formed of two portions, one being provided with effecter or shoulder forming the bottom of slots acting as straight edges or gauges to the slip under treatment, substantially as set forth.
4. The clamp provided with slotted projections at the ends for forming the broadened or thickened ends of the slip and the slots therein, substantially as set forth.

5. The combination of the shaving device and clamping form, acting upon the slip in succession to prepare it for carbonization substantially as described.
6. The method of preparing slips for carbonization, consisting in first shaving the slips to the required thickness and then putting them edgewise into form, substantially as set forth.

Application No 403

Filed . . . May 20, 1882.
 Rejected . . . June 23, "
 Amended & argued July 22, "
 Post Power atty to R. N. Byer Aug 2, "
 Reel " " " 14, "
 Rejected . . . Sept 2, "
 Addl afft filed Oct 10, "
 Inform Office Nov. 20, 12 "



Electro Magnetic Railway Systems

Claims

1. A system of electrical railroading in which a road is divided into

1. electrical sections, the rails forming the conductors, each section provided with a central station, at which are located a suitable engine, a generator of electricity, and means for controlling and completing the circuits to trains, and to switches, cars which are electrically, designed so that the motors thereon are insulated from the track and means for completing the circuit from line to line of rails through the motor, substantially as set forth.
2. The combination with a track switch of an electric motor and circuit for operating the switch, substantially as set forth.
3. The combination with a car frame insulated from the track of an electric motor, an electric traction device, of lamps or of any two of them, when they are arranged in multiple, are or derived circuits, substantially as set forth.
4. The combination with a car frame, of an electric engine, for actuating the car, and having its inducing and field of force magnets in separate, series or multiple, and circuits, substantially as set forth.
5. The combination with an electric engine mounted upon and actuating a car, of a circuit reverser and means for operating the reverser from a distant station, substantially as set forth.
6. The combination with an electric engine, mounted upon and actuating a car, and the main driving axle of a governor receiving motion from the latter and operating to break the circuit of the engine upon the attainment of a predetermined rate of speed, substantially as set forth.
7. The combination with a main electrically connected rail, section of a short section, connected to the main section by conductors arranged to change the polarity of the current traversing each line of rails, substantially as set forth.
8. A car wheel constructed of a metallic hub and a metallic center united by a wooden or insulating web, substantially as set forth.
9. A car in which an insulation is so applied that the body is electrically insulated from the flanges of the wheels, substantially as set forth.

10. The combination with an electric engine mounted upon and actuating a car, and the main driving axle, of a loose or flexible connection for conveying motion from one to the other, substantially as set forth.
11. The combination with a car of a magnet or magnets operating upon closure or circuit to increase the traction of the car upon the track by their magnetic influence, substantially as set forth.
12. The combination with the insulated flange and the contact spring for carrying the current therefrom, of several multiple file circuits each containing a device, used in running, controlling or lighting the car, substantially as set forth.
13. The combination with a car of an additional grooved wheel mounted in an adjustable bearing, means for elevating or depressing the wheel and its bearing, and a loose or flexible connection therefrom to the main driving axle, substantially as set forth.
14. The combination of a loose friction pulley on the main driving axle, a friction pulley on the motor shaft, and a swinging or movable pulley for connecting the two, a sprocket wheel on the loose pulley, a sprocket wheel on the shaft of the grooved wheel, and a sprocket chain, substantially as set forth.
15. The combination with the operating lever of a circuit reverser, of a cam plate normally holding the swinging levers of the reverser out of contact with their anvil, and always opening one circuit before closing another, substantially as set forth.
16. The combination upon one car of an electric engine for actuating the car, a circuit reverser, a centrifugal governor, acting to make or break the circuit, and a magnet or magnets operating to increase the traction of the car upon the track, substantially as set forth.
17. The combination with main driving and ordinary wheels of a car, of a wheel adapted to grasp the track, and to be brought into operation as desired, substantially as set forth.

18. The combination of the main track section, the section No. 2, and p.v. and circuit connections, and switch motors, whereby trains may be passed by each other, substantially as set forth.

19. The combination of a ^{stationary} dynamo electric generator, driven by a suitable motor; a circuit of conductors, composed in part of an insulated or detached section of the line of rails of a railroad track, a wheeled vehicle movable upon or along said insulated section of track; an electromagnetic motor mounted upon said vehicle for propelling the same, and included in said circuit of conductors, and a circuit controlling device placed upon said vehicle.

404

Application N° 404

Filed August 7, 1882
 Rejected " 23 "
 Amended Sept. 11 "
 Rejected " 14 "
 Amended (diag corrected) " 15 "
 Suspended in view of interference " 15 "
 Adm. app. filed October 10 "
 Interference declared with
 Chas. E. Scribner Nov 27 82
 Amended March 15 83

By ex J. H. E. M.

Dynamo or Magneto Electric Machines

Claims

1. The combination of two or more electric circuits, having currents of different tensions, derived from the same main dynamo or magneto electric machine, substantially as set forth.
2. The combination with a dynamo or magneto electric machine, of commutator brushes or connections adapted to supply two or more electric circuits with currents of different tension, substantially as set forth.
3. The combination with a single commutator of a dynamo or magneto electric machine, of brushes or collectors bearing thereon and circuit connections with a main circuit and one or more extra circuits having a current of lower tension than that in the main circuit, substantially as set forth.

4. The combination with a dynamo or magneto electric machine of two or more electric circuits, differing in electro motive force derived therefrom, and means for independently regulating the electromotive force of each circuit, substantially as set forth.
5. The method of deriving two or more circuits differing in electro motive force from a dynamo or magneto electric machine, consisting in completing the circuits at the same commutator at points varying in extent of difference of potential, substantially as set forth.

409

Application No 409.

Filed August 7, 1882

Rejected " 24 "

Adm. off. filed Oct 10, "

9:10' 30' a.m.

Incandescing electric lamps

Claims

1. In an electric lamp the combination with an incandescing conductor of an exhausted glass enclosing chamber, composed of two parts secured together by a ground union or seal at their meeting surfaces, substantially as set forth.
2. A glass enclosing chamber or globe for incandescing electric lamps consisting of two parts removably secured together by a ground union or joint adapted to maintain the vacuum within the globe or chamber, substantially as set forth.

409

Incandescing Electric Lamps

Filed Aug. 7, 1885.

Division 22221
Pat. 772
CopyClaims.

First: In an electric lamp, the combination with an incandescing conductor, of an exhausted glass enclosing chamber, composed of two parts secured together by a ground union or seal of their meeting surfaces, substantially as set forth.

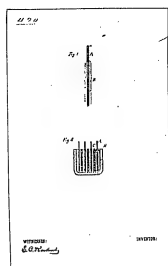
Second: A glass enclosing chamber or globe for incandescing electric lamps consisting of two parts removably secured together by a ground union or joint adapted to maintain the vacuum within the globe or chamber substantially as set forth.



Application No. 420.

Filed June 26, 1882
 Rejected July 16, "
 Cont'd answer atty to R. N. Byer filed Aug 2,
 additional appl. filed Oct 10.

See Batteries.



Secondary Batteries.

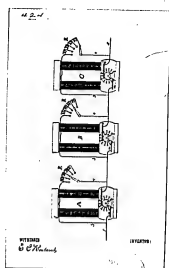
Claims.

1. The electrodes for secondary batteries composed of electro-plated lead plates, substantially as set forth.
2. In secondary batteries, the combination with the electro-plated lead plates, of the non-conducting perforated partitions, substantially as set forth.

Filed . . . August 7, 1882.
 Rejected . . . " 23, "
 Amended . . . Sept. 29, "
 Adm. app. filed Oct 10, "
 Called up for action Jan'y 19, '83
 Rejected January 26, '83

Application N° 424.

Operating Elec. Motors and Generators



Operating Electrical Motors and Generators

Claims

(The top claim is the second made a mistake). 2 The combination of a number of electro-dynamic motors or dynamo electric ^{generators} machines or both having their armature coils connected in series and the coils of field magnet of each machine located in a shunt around the armature coils with means for regulating the machines independently, substantially as set forth.

1 The combination of a number of electro-dynamic motors or dynamo electric ^{generators} machines or both connected in series and regulated independently, substantially as set forth.

3 The combination of a number of electro-dynamic motors or dynamo electric generators or both having their armature coils connected in series and the coils of the field magnet of each machine located in a shunt around the armature coils with means for regulating each machine independently of all others by primarily independently varying the strength of its field magnet, substantially as set forth.

427

Application No 1427.

Filed August 7, 1882.
 Verbal amendment " 21, "
 Rejected " 23, "
 Amended " Sept 8, "

Interference with Edward Weston
 declared September 15, 1882.
 Additional opt. filed Oct 10, 1882.

Means for Regulating Electrical Generators

Claims

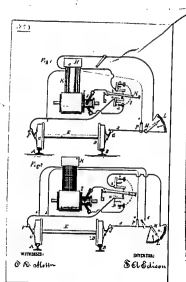
1. The combination with a dynamo or magneto electric machine of a device for throwing counter electromotive force into its field circuit and an electric motor working such device and operated by the current generated, substantially as set forth.
2. The combination with a device for throwing counter electromotive force into the field of the generator of an electric motor working such device and a governor controlling the speed of such motor, substantially as set forth.
3. The combination with a device for throwing counter electromotive force into the field of a generator of an electric motor working such device a centrifugal governor breaking the motor circuit at a definite speed and a shunt around the breaking point automatically closed when the electromotive force increases to a definite point, substantially as set forth.

4. The combination with a device for throwing counter-electromotive force into the field of a generator the electro-motor, and the governor of an electro-magnet located in a multiple arc circuit from the main conductors of the generator and closing a shunt around the breaking points controlled by the governor, substantially as set forth.
5. As a means of producing counter-electromotive force the combination of two or more electro-magnets connected together and with commutator bars upon which move brushes located in the circuit in which the counter-electromotive force is thrown, substantially as set forth.
6. The combination of two or more electro-magnets, the coils of which are arranged in a closed circuit with a stationary commutator for the bars of which are connected with said magnet circuit between the magnets and revolving commutator brushes located in a circuit in which it is desired to throw a counter-electromotive force, substantially as set forth.

Application No. 428.

Filed August 7, 1882.
 Rejected Sept. 11, "
 Made appt. filed Oct. 10, "
 Amended Jan'y 27, 1883
 Rejected " 31st "
 Amended Feb'y 17th "
 Rejected March 6, "

Electro Magnetic Railway Engine



Electro Magnetic Railway Engine

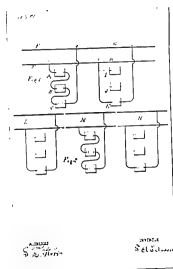
Claims

1. The combination with an electro-dynamic motor mounted upon a wheeled vehicle, and propelling the same of an adjustable resistance for regulating the speed of such motor, substantially as set forth.
2. The combination with an electro-dynamic motor mounted upon a wheeled vehicle and propelling the same of an adjustable resistance and a circuit controller and reversed, substantially as and for the purposes set forth.
3. In an electric railway engine the field magnet of the motor wound in two separate layers or behind one of finer wire than the other and used as the permanent field circuit and the other adapted to be thrown into or out of circuit as desired, substantially as set forth.
4. In an electric railway engine the combination with the armature circuit of the motor of a multiplex circuit including a portion of the coils of the field magnet and another multiple circuit of coarser wire than the first including the remainder of the coils and provided with means for throwing them into or out of circuit as desired, substantially as set forth.

429

Application No 1129.

Filed . . . August 7, 1882.
 Rejected . . . Sept. 11, "
 Adm. aft. filed Oct. 10, "



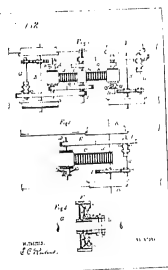
Electric Railway Systems

Claims

1. The combination with the rails of a railway track forming part of an electrical circuit of a number of dynamo electric generators arranged in series and electrically connected with said rails, substantially as set forth.
2. The combination with the rails of a railway track forming part of an electrical circuit of a number of dynamo electric machines arranged in series and electrically connected with said rails, substantially as set forth.

Application No. 432.

Filed . . . August 7, 1882.
 Rejected. . . Sept. 12, "
 Adm. off. filed Oct. 10, "
 Amended Jan'y 27, 1883
 Appeal filed " 26, "
 Rejected Feb'y 18, "
 Amended " 17, "
 Rejected March 6, 1883



Electro Magnetic Railway Engines

Claims

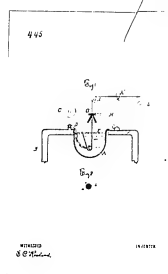
1. In an electro magnetic railway engine the combination with one or more electro dynamic motors mounted thereon and the driving axle or axles thereof of means for connecting or disconnecting the armature or armatures of said motor or motors and said axle or wheels, whereby the engine may be stopped by withdrawing the former from said axle or axles without stoppage of the motor, substantially as set forth.
2. In an electro magnetic railway engine the combination with one or more electro dynamic motors mounted thereon and the driving axle or axles thereof of an endless belt, rope, or other flexible connection and a friction clutch located between each motor, armature and the axle thereby, substantially as set forth.
3. In an electro magnetic engine the combination of the armature shaft or shafts of one or more electro dynamic motors, a belt or other flexible connection between each shaft, and a friction clutch mounted upon a counter shaft and a slowing down gearing, connecting each counter shaft with a driving axle of the engine, substantially as set forth.

Filed

Application No 445

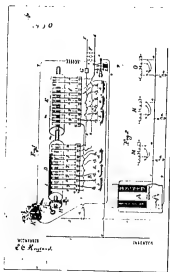
Rever fisco

Methods and means for covering insulated
 wire with lead.



Application No 450.

Filed June 26, 1882.
 Rejected July 17, "
 Gen. Power atty to R. W. Byer Aug 2, "
 Spec. " 14, "
 Amended & duly corrected " 18, "
 Adm. off. filed " 23, "
 Rejected Sept. 6, "
 Adm. off. filed Oct. 10, "
 Letter from office Aug. 6, 1883
 Interference with E. A. Byer Aug. 13,
 declared, Sept. 20, 1883.



Systems of Electric Lighting

Claims

1. In a system of electric lighting, the combination with an electrical generator and electric lamps, of two or more intermediate secondary batteries thrown alternately or in succession into connection with the generator, and the lamps each secondary battery being composed of a plurality of secondary cells or batteries which are recharged in series and discharged in multiple, are, substantially, as set forth.
2. In a system of electric lighting, the combination with an electrical generator and electric lamps, of two or more intermediate secondary batteries each composed of a plurality of secondary cells or batteries and commutators for throwing said batteries alternately or in succession into connection with the generator, and the lamps and for changing the relation of the cells of each battery from series in charging, to multiple in discharging, substantially, as set forth.
3. The combination with an electrical generator and electric lamps, of two or more intermediate secondary batteries, commutators, and a mechanism for throwing such batteries alternately or in succession into connection with the generator, and lamps, and a mechanism operated by the current for working such commutators, substantially, as set forth.
4. The combination with an electrical generator and electric lamps arranged

Dependent upon the nature of the current in the translation circuit substantially as set forth.

10. The improvement in the art of distributing electricity consisting in charging for intensity the elements of one pair of secondary batteries from a main circuit having a current of electricity, the other battery of the pair is discharging in quantity, and the relation of such secondary batteries being fundamentally reversed substantially as set forth.

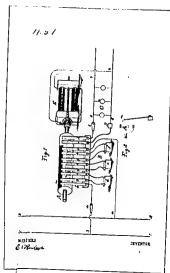
(for relation per magis)

- in multiple, one of two or more intermediate secondary batteries ~~and~~ commutators throwing such secondary batteries alternately, or in succession into connection with the generator and lamps, a mechanism for working such commutators and an electric magnet arranged in ^{and conducting the operation of such} multiple in the lamp circuit, mechanism, substantially as set forth.
- 5 In a system of electric lighting the combination with an electrical generator of main conductors leading therefrom connected throughout in multiple arc, multiple arc circuits from each main conductor containing secondary batteries charged from such generator, and multiple arc circuits from the secondary batteries containing electric lamps, the secondary batteries being charged from the generator and then discharged through the lamps, substantially as set forth.
- 6 In a system of electric lighting the combination with an electrical generator, main conductor leading therefrom and house circuits from the main conductor connected throughout in multiple arc of two or more secondary batteries in each house circuit and lamp circuits supplied from the secondary batteries, such secondary batteries being thrown alternately, or in succession into connection with the generator and the lamps, substantially as set forth.
- 7 In a system of electric lighting the combination with an electrical generator, main conductors leading therefrom and house circuits from the main conductors connected throughout in multiple arc, of lamp circuits, and intermediate secondary batteries charged in series from the main circuit and discharging in multiple arc through the lamps, substantially as set forth.
- 8 In a system of electric lighting the combination with an electrical generator, of main and house conductors leading therefrom and connected throughout in multiple arc, electric lamps, intermediate secondary batteries charged from the generator, and discharged through the lamps and means for measuring the current consumed, substantially as set forth.
- 9 The improvement in the art of distributing electricity for translation into light, heat or power, consisting in charging, one of a pair of secondary batteries from a main circuit while the other battery of the pair is discharging through translating devices the relation of such batteries being reversed periodically, substantially as set forth.
- 10 The improvement in the art of distributing electricity, consisting in charging for intensity, the elements of one of a pair of secondary batteries from a main circuit having a current of high tension, while the other battery of the pair is discharging in quantity, through the translating devices and reversing the relation of such batteries automatically by means of a

451

Application No 451.

Filed June 26, 1882.
 Rejected July 18, . . .
 Genl Power of Atty to R. Dwyer Aug 2, . . .
 Quoted " " " " 14, . . .
 Amended & dwg corrected. " 18, . . .
 Rejected Sept. 5, . . .
 Adm offr filed . . . Oct 10, . . .
 Letter from Office Nov. 26, 1883.



Systems of Electric Lighting

Claims

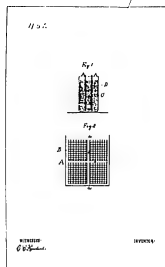
1. In a system of electric lighting, the combination with a main circuit, and a lamp circuit, of an intermediate secondary battery or condenser, and a continuously revolving commutator throwing such battery or condenser rapidly into connection with the main circuit and with the lamp, substantially as set forth.
2. In a system of electric lighting, the combination with a main circuit having a current of high tension, and a lamp circuit of an intermediate pressure reducer for transforming the high tension current in the main circuit to one of lower tension in the lamp circuit, substantially as set forth.
3. In a system of electric lighting, the combination with a main circuit and a lamp circuit, of an intermediate battery or condenser, and a continuously working commutator throwing the elements of such secondary battery or condenser rapidly, from a connection with the main circuit to a multiple arc connection with the main circuit to a multiple arc connection with the lamp circuit and back again, substantially as set forth.

4. In a system of electric lighting, the combination with a main circuit, of a lamp circuit having, lamps connected in multiple arc, and an intermediate secondary battery or condenser, the elements of which are thrown rapidly, from a series connection with the main circuit to a multiple arc connection with the lamp circuit; substantially as described and shown.
5. In a system of electric lighting, the combination with a main circuit and lamp circuit, of an intermediate secondary battery or condenser, a commutator throwing the elements of such secondary battery or condenser from a series connection with the main circuit to a multiple arc connection with the lamp circuit, and an electric motor for working such commutator; substantially as set forth.
6. The improvement in the art of distributing electricity, consisting in transmitting a current of high tension through a main circuit and supplying translating devices in separate independent circuits with a current of lower tension through the intervention of a tension reducer; substantially as set forth.
7. The improvement in the art of distributing electricity, consisting in transmitting a current of high tension through a main circuit, and rapidly charging secondary batteries or condensers for intensity in such main circuit and discharging them for quantity through translating devices; substantially as set forth.

Application No 452.

Filed June 26, 1882.
 Rejected July 10, "
 For Comm. App. Office Aug 2 "
 Rejected " " " 14 "
 Amended " 16 "
 Rejected " Sept. 14, "
 Adm. app. filed Oct. 10, "
 Amended Jan'y. 22, 1883
 Rejected " 31 "
 Amended June 6 "
 Rejected " 18 "

Secondary Batteries



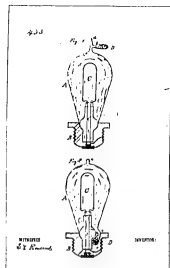
Secondary Batteries

Claims

1. An electrode for secondary batteries, formed of filamentary metallic lead, substantially as set forth.
2. An electrode for secondary batteries formed of filamentary metallic lead with solid portions for retaining its shape and making connections, substantially as set forth.

Application N^o 453.

Filed June 26, 1882.
 Rejected July 10, "
 Pat. Power Atty to R. N. Dyer Aug 2, "
 Spec. " " " " 14, "
 Rejected 25, "
 Amended 14, "
 Adm. off. filed . . Oct. 10, "



Incandescent Electric Lamps

Claims

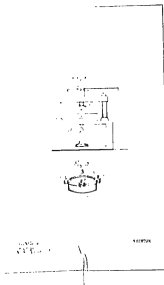
1. The method of absorbing the aqueous vapor within the globe of an exhausted incandescent electric lamp, consisting in providing the lamp with a drying compound which remains within or in connection with the interior of the lamp globe after the same has been exhausted, and sealed from connection with the pump, substantially, as set forth.
2. The combination with the exhausted and sealed globe of an incandescent electric lamp, of a drying compound, substantially, as and for the purpose, set forth.

Application No 455.

Filed . . . August 14, 1882.

Replied . . . Sept. 30, "

Adm. offt. filed Oct. 10, "



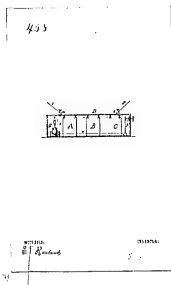
The manufacture of incandescing conductors for Electric Lamps

Claims.

1. In the manufacture of flexible carbon filaments for incandescing electric lamps from nitrated compounds of cellulose, the method of preventing the warping of the material on drying, consisting in drying the same under strain, substantially as set forth.
2. In the manufacture of flexible carbon filaments for incandescing electric lamps from nitrated compounds of cellulose, the method of reducing the sheets of the material to a uniform thickness, consisting in pressing them between suitable plates, substantially as set forth.
3. The method of manufacturing flexible carbon filaments for incandescing electric lamps, consisting in reducing nitrated compounds of cellulose to flat even sheets of uniform thickness by strain and pressure, from which sheets the filaments are first formed, and then carbonized, or the filaments are formed from the sheets after carbonization, substantially as set forth.

Application No 458.

Filed . . . August 14, 1882.
 Rejected . . . " 24. "
 Adm. app. filed Oct. 10, "



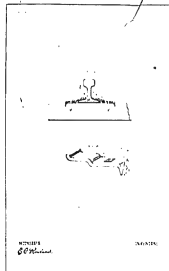
Secondary Batteries

Claims

1. The combination with a secondary battery of means preventing the freezing of the liquid of the battery, substantially as set forth.
2. The combination with a secondary battery of an electrical resistance and a thermostatic circuit controller, substantially as set forth.

Application No 466.

Filed . . . August 14, 1882.
 Additional afft. Oct. 10, "
 Rejected . . . " 11, "
 Amended . . . Jan'y 27, 1883
 Rejected . . . Feb'y 2, "
 Amended . . . " 17, "
 Rejected . . . " 24, "
 Letter from Office Sept 17, "
 Letter to Office " 6 "
 Letter from Office " 18 "



Electrical Railroads

Claims

1. In an electrical railroad, rails used as conductors to carry current to or from the motor, insulated, except at the head of the rails by japanning, substantially as set forth.
2. In an electrical railroad, an insulating cushion for rails used for carrying current to or from the motor, composed of japanned flexible material, substantially as set forth.
3. In an electrical railroad, the metal clamping plates for the purpose set forth covered with an insulating material, substantially as set forth.
4. In an electrical railroad, the metal clamping plates for the purpose set forth having japanned surfaces, substantially as set forth.
5. In an electrical railroad, a metal clamping plate pressing upon insulating material on the foot of the rail, and having a face flange resting upon the ties for securing the spikes, substantially as set forth.
6. In an electrical railroad, a metal clamping plate pressing upon insulating material on the foot of the rail, and provided with a rounded or upwardly turned end to prevent putting, such

insulating material, substantially as set forth

7. In an electrical railroad, a metal clamping plate pressing upon insulating material on the foot of the rail, provided with a base flange fitting upon the tie and pressing the spike, and with one or more prongs entering the tie, substantially as set forth
8. In an electrical railroad, the combination with one or more lines of rails used as conductors and resting upon wooden cross-ties, of means securing the rails to such wooden ties and insulating therefrom, substantially as set forth
9. In an electrical railroad the combination with one or more lines of rails used as conductors and resting upon wooden cross-ties, of means securing the rails to such wooden ties, insulating both from the ties and the rails, substantially as set forth
10. In an electrical railroad the securing spikes covered with an insulating material, substantially as set forth
11. In an electrical railroad the flanged securing spikes, substantially as set forth

476

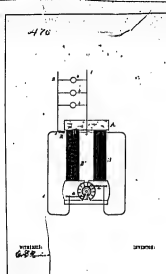
Filed

Adm. Offt.

Rejected

Sept 27th 1892Oct 18th 1892Oct 25th "

Application No 476



Dynamo Electric Machines

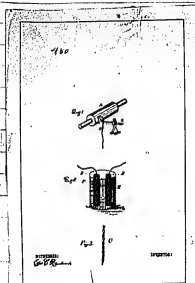
Claims

1. A dynamo electric machine having all the coils of its field magnet included in a circuit of constant resistance, and a portion of said coils included also in a circuit whose resistance is varied by the addition or removal of translating devices, said translating devices being arranged in multiples, are from said machine, substantially, as set forth.
2. The combination with a dynamo electric machine, of the field circuit partly of coarse wire including one limb of the field magnet and partly of fine wire including the other limb and the main conductor connected to said field circuit at points one on each side of said fine wire coils, substantially, as set forth.

480

Filed September 15th 1892
 Rejected " 30th "
 Advs. Aff'd. October 10th "
 Amended January 22nd 1893
 Rejected " 31st "

Application No. 470.



Secondary Batteries

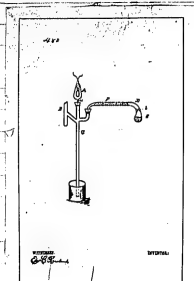
Claims

1. The electrodes for secondary batteries each formed of a number of strips of metallic lead twisted together substantially as set forth.
2. The electrodes for secondary batteries each formed of a number of strips of lead ^{each} of such strips being ^{first} twisted by itself, and all the strips being then twisted into a bundle, substantially as set forth.

482

Application No 482

Filed September 2nd 1882
 Adm. Offt. October 10th
 Rejected 16th
 Amended March 14th 1883
 Rejected 8th



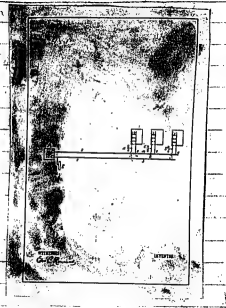
The manufacture of incandescing electric lamps

claims

The method of producing a high vacuum in the enclosing globe of an incandescing electric lamp, consisting in exhausting the air therefrom as completely as possible, then introducing a quantity of oxygen gas, within said globe, exhausting such gas, and refilling the globe several times until the small quantity of residual gas remaining in the globe is composed almost entirely of oxygen, substantially as set forth.

1484

Filed September 22nd 1882
 Adm. Affs. October 10th
 Allowed 10th

Application N^o 1484

Systems of Electrical Distribution

Claims

1. The combination with an entire or round metallic circuit, the conductors of one side of which are of smaller mass than the other, of ground connections from said smaller half auxiliary, then to substantially as set forth.
2. The combination with a feeding circuit and a main or consumption circuit connected therewith of ground connections from several points on one side of said main or consumption circuit and a ground connection from the corresponding side feeding circuit, substantially as set forth.

1485

Application No 485

Filed January 15th 1883Replied " 29th "Interference with Maxim and
Parmer, declared February 2nd 1883

Incandescing Electric Lamps

Claims

1. In an incandescing electric lamp, the combination with the conductors sealed therein, of a continuous conductor of carbon, gradually enlarged at or near its ends, substantially as and for the purpose set forth.
2. A continuous conductor of carbon for use with an incandescent electric lamp consisting of a stem, a gradually tapering portion, and an enlarged portion, substantially as and for the purpose set forth.

486

Filed January 15. 1883

Rejected " 29 "

Amended June 12 "

Rejected Aug. 7 "

Application No. 486

Incandescent Electric Lamps

Claims

1. A flexible filamentary blank, for forming upon carbonization the flexible carbon filament of an incandescing electric lamp, composed of a decomposable compound containing carbon, which when decomposed leaves a carbon residue of relatively great porosity and small mass, substantially as set forth.
2. A flexible filamentary blank of carbonizable material, having enlarged ends, for forming upon carbonization, a flexible carbon filament for an incandescing electric lamp, having relatively great porosity and small mass, substantially as set forth.
3. As the incandescing conductor for an electric lamp, a flexible carbon filament of relatively great porosity, and small mass, having ends of lower resistance than its body, substantially as and for the purpose set forth.
4. The combination with a hermetically sealed inclosing chamber, made entirely of glass, of a flexible carbon filament of relatively great porosity and small mass, having ends of lower resistance than its body, and leading in wires passing through and sealed into the glass, and connected with the ends of such filament, substantially as set forth.

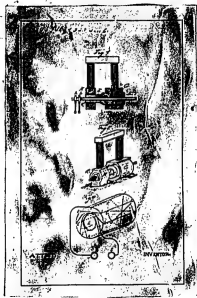
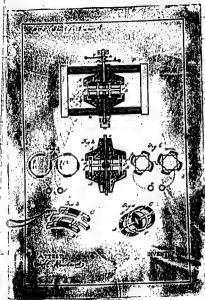
5. A blank of carbonizable material for forming a filamentary, incandescing carbon, put on formed with ends enlarged in one plane, substantially as set forth.
6. A carbon for incandescing electric lamps made as a filament with its ends broadened or enlarged in one plane, substantially as set forth.
7. On an incandescing electric lamp, the combination with the tubular supporting neck, of the leading in wires passing through such neck and therein insulated from each other substantially as set forth.
8. On an incandescing electric lamp, the combination with the tubular supporting neck, of the leading in wires passing through such neck, and tubes of insulating material surrounding such wires within the neck, substantially as set forth.

495

Filed
RepealedOctober 17th
December 9th

1892

Application No. 495



Dynamo or Magnetoelectric Machines Claims.

1. The method of generating continuous electric currents in one direction, consisting in causing a conductor or any definite portion thereof to always cut the same lines of force in the same circuit, substantially, as set forth.
2. The method of generating continuous electric currents in one direction, consisting in moving a conductor or any definite portion thereof, wholly within the influence of one pole of a magnet, and causing the conductor to cut the line of force from such pole always in the same direction, substantially, as set forth.
3. The method of generating continuous electric currents in one direction, consisting in directing the magnetic lines of force to or from an armature core, so as to be cut by the bottom lip of such core, and directing such lines of force from or to the core, without being cut by the bottom, whereby the bottom will always cut the same lines of force in the same direction, substantially, as set forth.
4. The method of generating continuous electric currents in one direction, consisting in directing the magnetic lines of force to or

from an armature core, so as to be cut by the bobbin upon such core, turning the lines of force at right angles within such core and directing them from or to the core without being cut by the bobbin whereby the bobbin will always cut the same lines of force in the same direction, substantially as set forth.

5. On a dynamo or magneto electric machine, the combination with the field magnet of a core within the influence of each pole, a magnetic connection between such cores, and a bobbin upon either or upon each of said cores, substantially as set forth.
6. The combination with the field magnet, of a bobbin partly or wholly surrounded by one pole of said magnet, and wholly within the influence of each pole, substantially as set forth.
7. The combination with the field magnet, of a core within the influence of each pole, a magnetic connection between such cores, and a bobbin upon either or upon each of said cores, such bobbin being wound to avoid the magnetic connection between the cores whereby the lines of force are turned at right angles within the core and are conducted off through the magnetic connection without being cut a second time by the bobbin, substantially as set forth.

496

Filed

October 20th

1872

Repealed

November 13th

Application No. 496

Incandescing Conductors for Electric Lamps.

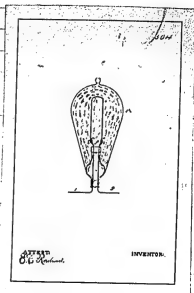
Claims

1. A flexible carbon filament for the incandescing conductor of an electric lamp formed of parchmentized cellulose, substantially as set forth.
2. The method of forming flexible carbon filaments for the incandescing conductors of electric lamps, consisting in carbonizing parchmentized cellulose, the material being reduced to the proper size and shape before or after carbonization, substantially as set forth.
3. The method of forming flexible carbon filaments for the incandescing conductors of electric lamps, consisting in parchmentizing cellulose, by the action of sulphuric acid or equivalent agent and pressing the resulting material into shape from which the filaments are to be formed before or after carbonization, substantially as set forth.
4. The method of forming flexible carbon filaments for the incandescing conductors of electric lamps, consisting in parchmentizing cellulose, by the action of sulphuric acid, or similar agent, removing the acid from the resulting material, and pressing the same into shape from which the filaments are to be cut before or after carbonization, substantially as set forth.

504

Filed October 24th 1888
 Rejected October 30th "
 Amended January 22nd 1889
 Rejected 25th "
 Amended March 12th "
 Rejected March 19th 1889

Application No. 504



Incandescing Electric Lamps.

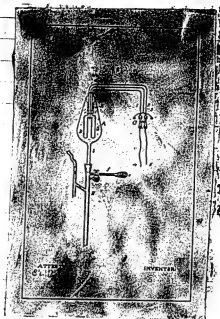
claims

1. In an incandescing electric lamp, the metallic portions within such lamp coated with insulating material, substantially as set forth.
2. In an incandescing electric lamp, the enlarged ends or a portion thereof of the incandescing filament coated with insulating material, substantially as set forth.
3. In an incandescing electric lamp, the metallic leading-in wires within the globe, and the ends of the carbon filament united to each wire, both coated with insulating material, substantially as set forth.
4. In an incandescing electric lamp, the leading-in wires and the ends of the carbon filament coated with japan varnish, substantially as set forth.

509

Filed November 9th 1882.
 Rejected December 16th "
 Amended January 27th 1883.
 Interference with
 Martin February 26th 1883

Application No. 509



The Manufacture of Incandescing Electric Lamps

Claims

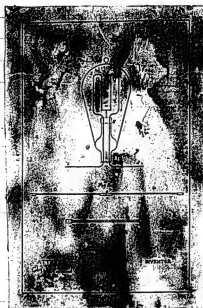
1. The method of testing and equalizing the resistance of carbon filaments connected together in an incandescing electric lamp, consisting in bringing them up to incandescence together, to determine whether or not their resistances are equal, and then depositing carbon upon the filament of greater resistance, substantially as set forth.
2. The method of equalizing the resistance of carbon filaments connected together in an incandescing electric lamp, which consists in raising the filament of higher resistance to incandescence and depositing carbon thereon, substantially as set forth.
3. The method of equalizing the resistance of carbon filaments connected together in an incandescing electric lamp, consisting in raising the filament of higher resistance to incandescence, while the other remains cold and permitting a gas to enter the globe, which will deposit carbon upon the heated filament, substantially as set forth.
4. The method of testing and equalizing the resistance of carbon filaments connected together in an incandescing electric lamp, consisting in bringing the filaments connected in series up to incandescence to determine whether or not their resistances are equal, then disconnect-

ing the filament of less resistance having the other in circuit heating the latter to incandescence and depositing carbon upon it, connecting them again in series to determine whether their resistance is now equalized and repeating this process as many times as may be necessary, substantially as set forth.

516

Filed
RepeatedNovember 9, 1882
December 6, 1882

Application No. 510.



Incandescent Conductors For Electric Lamps

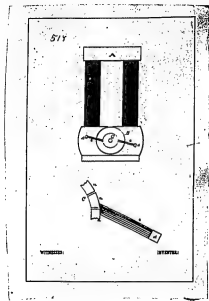
Claims

1. The method of producing similar filaments for the incandescent conductors of electric lamps consisting in forming them from the same body of material, substantially as set forth.
2. The method of producing similar carbon filaments consisting in forming the filaments from the same body of material, and carbonizing them under the same conditions, substantially as set forth.
3. The combination in an incandescent electric lamp of two or more carbon filaments placed in series, formed from the same body of material, and carbonized together, substantially as set forth.

518

Filed
RevisedNovember 30th 1882
January 25th 1883

Application No. 518.



Commutators for Electrical Generators and Motors.

Claims

1. In a dynamo or magneto-electric machine the combination with the commutator cylinder of the brushes placed so that their ends bear directly, upon said cylinder, substantially, as set forth.
2. The combination with the commutator cylinder of the brushes set at an angle thereto and having their ends bevelled so that such ends bear directly, upon said cylinder, substantially, as set forth.

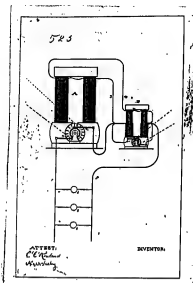
523

Filed December 8th 1882.Rejected January 31st 1883.Amended. Off. March 12th "Rejected March 21st "Letter from Office Sept 3rd "Amended " 5th "

Interference with Above Claim.

declared Sept. 11th 1883.

Application No. 523.



Regulators for Dynamo Electric Machines

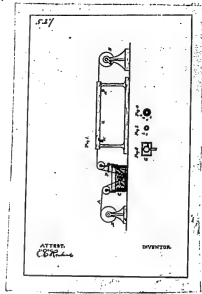
Claims

1. The combination with a magneto electric machine and translating devices arranged in multiple arc, of an exciting machine for energizing the field of the other, and means actuated by variations in the number of translating devices in circuit for regulating the current generated by the exciter, substantially as set forth.
2. The combination with a magneto electric machine and translating devices arranged in multiple arc, of an exciting machine for energizing the field of the other, all or a part of the field coils of the exciter, being included in the main circuit of the generator, substantially as set forth.

527

Filed
RejectedDecember 1, 1902
28

Application No 527



Electrical Conductors

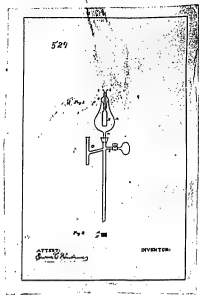
Claims

1. Wire insulated with Japan varnish, substantially as set forth.
2. Wire insulated by a wrapping of fibrous material, such material being coated with a substance whose principal ingredient is a drying oil, substantially as set forth.
3. Wire insulated by alternate layers of fibrous material, and a substance whose principal ingredient is a drying oil, substantially as set forth.
4. The method of insulating material wire consisting in coating it with Japan varnish, baking the same and repeating these operations as many times as may be necessary, substantially as set forth.
5. The method of insulating wire consisting in passing it through a bath of Japan varnish, stripping off the superfluous varnish, drying the same and baking it, these operations being repeated as many times as may be necessary, substantially as set forth.

529

Filed January 13th, 1898
 Rejected " 24th "
 Inquired " 11, 1898
 Rejected March 27, "

Application No. 529.



Incandescent Electric Lamps

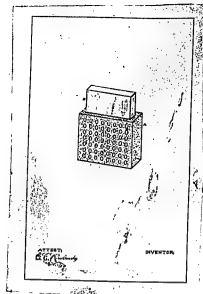
Claims

1. A carbon incandescent conductor for electric lamps, provided with a coating of another high resistance conducting material substantially as set forth.
2. The combination with ^{an} enclosing globe of a carbon incandescent conductor provided with a coating of pilsen, substantially as set forth.
3. The flexible carbon filament of an incandescent electric lamp, provided with a coating of pilsen, substantially as set forth.
4. The method of coating carbon with pilsen consisting in raising the carbon to incandescence, by the passage of an electric current there through in the presence of a gaseous compound of pilsen decomposable by heat, substantially as set forth.
5. The method of treating the carbon filaments of incandescent electric lamps, consisting in exhausting the globe containing a filament and heating the filament to incandescence in the presence of a gas which contains pilsen and is decomposable by heat, substantially as set forth.

530

Filed January 8th 1893
Registered 19th "

Application No 530



Secondary Batteries

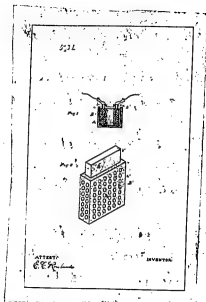
Claims

1. A metallic electrode for secondary batteries, having its active surface of a reduced oxide of the metal used, substantially as set forth.
2. A metallic electrode for secondary batteries having a surface formed of a reduced metallic oxide formed integral with a central core of the same metal, substantially as set forth.
3. A metallic electrode for secondary batteries having a surface formed of a reduced oxide of lead, integral with a central core of lead, substantially as set forth.
4. The method of forming metallic electrodes for secondary batteries consisting in reducing an oxide of lead to a metallic state to form a porous surface for the electrode, substantially as set forth.
5. The method of forming secondary battery electrodes consisting in moulding a metallic oxide into hollow form reducing said oxide to a metallic state, and filling the interior with the same metal in a molten condition, substantially as set forth.

331

Filed January 15th 1893
 Rejected February 27th "
 Amended April 24th "
 Rejected May 26th "

Application No 531.



The Art of Generating Electricity.

Claims

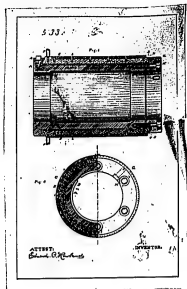
1. A chemically charged battery, substantially as set forth.
2. A primary battery having one electrode capable of oxidation and the other electrode capable of reduction, substantially as set forth.
3. A primary battery, provided with electrodes of the same metal, one such electrode having a surface capable of oxidation and the other a surface capable of reduction, both such surfaces being porous or divided, substantially as set forth.
4. The process of forming battery electrodes consisting in chemically reducing a metal oxide to form one electrode and ^{chemically reducing an} ~~the~~ ^{same metal} ~~oxide on one of said~~ ^{forming the other electrode} ~~chemically raising the oxide on the other core~~, substantially as set forth.
5. The process of forming the electrodes of a battery cell, consisting in moulding lead oxide upon two plates or cores, chemically reducing the oxide on one of said cores and chemically raising the oxide on the other core, substantially as set forth.

6. The process of generating electric energy, consisting in chemically reducing an oxide of lead to form one electrode, chemically oxidizing an oxide of lead to form the other electrode and finally, placing such electrodes in dilute sulphuric acid or equivalent chemical agent, while they are connected in an electric circuit, substantially as set forth.
7. The pair of battery electrodes, one having a surface of chemically reduced lead oxide, the other a surface of chemically raised lead oxide, substantially as set forth.
8. The pair of battery electrodes, each composed of a central core of metallic lead one electrode having a surface of chemically reduced lead oxide, the other a surface of chemically raised lead oxide, substantially as set forth.

533

Filed January 8th 1893
 Rejected February 20th "

Application to 533.



Commutators for Electrical Generators and Motors.

Claims

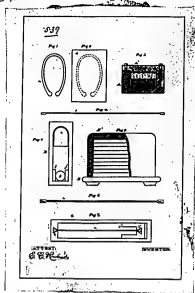
1. A commutator for electric generators and motors, provided with independently removable conducting surfaces, substantially as set forth.
2. In a commutator for electric generators and motors, the combination with a cylinder of conducting strips secured thereto independently, substantially as set forth.
3. In a commutator for electric generators and motors, the combination the combination with a metal cylinder, of conducting strips secured thereto independently, and intermediate insulation, substantially as set forth.
4. In a commutator for electric generators and motors, the combination with a metal cylinder of metal strips attached upon said cylinder, but insulated therefrom and from each other, and an exterior metal strip attached to each of said first mentioned metal strips, substantially as set forth.
5. In a commutator, the combination with the cylinder, and the strips secured thereto and insulated therefrom, of the metal

collar clamped upon the end of said cylinder, substantially as set forth.

539

Filed January 18th 1888
 Registered April 18th "

Application No 539



The manufacture of Incandescent Electric Lamps

Claims.

1. The method of carbonizing blanks or sheets for forming flexible carbon filaments for incandescent electric lamps, consisting in subjecting the same to the action of heat while under pressure or strain, substantially as set forth.
2. A mould for carbonizing blanks or sheets for forming flexible carbon filaments for incandescent electric lamps, provided with means for retaining the blanks or sheets under pressure or strain during carbonization, while permitting contraction, substantially as set forth.

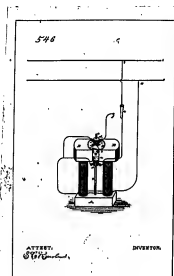
File

Filed

Rejected

March 16th 1893May 24th 1893

Application 14546



Electro Motors

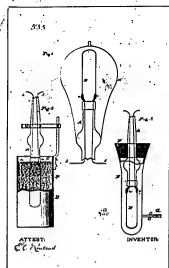
Claims

1. An electro-dynamic motor having two armatures on the same shaft, included in divisions of the same circuit and having opposite windings or connections, substantially as set forth.
2. An electro-dynamic motor having two oppositely wound or connected armatures on the same shaft and included in divisions of the same circuit, in combination with means for closing circuit through one or the other of said armatures when by said shaft is made to revolve in one or the other direction, substantially as set forth.
3. An electro-dynamic motor having a single field magnet, and two oppositely wound or connected armatures on the same shaft, in combination with a divided circuit the main portion including the field magnet and each division including an armature and means for closing circuit through each division separately, substantially as set forth.

553

Filed
RejectedApril 17th 1898
June 20th ..

Application No. 555



Electric Lamp & the Manufacture thereof

Claims

1. The leading-in wires extending above the glass stem of the globe of an incandescent electric lamp, coated entirely with carbon, substantially as set forth.
2. In an incandescent electric lamp, a coating of carbon covering the leading in wires from the points in contact with the glass to the junction with the filament, the clamping portions, and portions of the incandescent conductor, substantially as set forth.
3. The within described process, consisting in coating the metallic portions to be placed within an incandescent electric lamp with carbonizable material, and then carbonizing such material, substantially as set forth.
4. The within described process, consisting in wrapping sheets of carbonizable material around the metallic portions to be placed within in an incandescent electric lamp and then carbonizing such material, substantially as set forth.

5. Shew within described process, consisting in coating the metallic portions to be placed within an incandescing electric lamp with carbonizable material, placing such portions in a receptacle containing either a vacuum or a fluid preventing oxidation, and heating such receptacle externally, substantially as set forth.

566

Filed	April 20 th 1888	
Rejected	June 19 th	"
Adverse Aff'd	" 29 th	"
Rejected	Aug. 20 th	"
Amended	" 27 th	"
Rejected	Sept 15 th	"
Letter to Office	" 22 nd	"

Application No 560.

Encasing Conductors For Electric Lamps

Claims

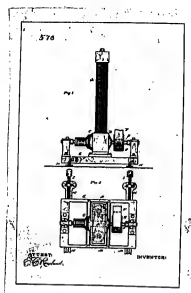
1. An incandescing conductor for an electric lamp formed of carbonized parchementized organic material, substantially as set forth.
2. An incandescing conductor for an electric lamp formed of carbonized parchementized vegetable fiber, substantially as set forth.
3. The process of making carbon conductors for electric lamps consisting in parchementizing organic material and then carbonizing the same, the material being formed into filaments at any stage of the process, substantially as set forth.

240
576

Filed
Rejected
Amended
Rejected

June 29th 1893
Aug. 25, 1893
Dec. 13 "
" 26 "

Application No 576



Dynamo Electric Machines

Claims

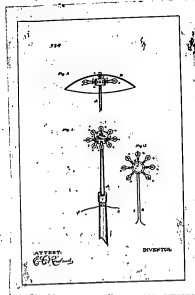
1. The comb with a dynamo electric machine connected by a belt with its actuating motor of means for moving said machine away from said motor, substantially as and for the purpose set forth.
2. A dynamo electric machine connected by a belt with its actuating motor and mounted upon ways, substantially as set forth.
3. The comb with a dynamo electric machine connected by a belt with its actuating motor, and mounted upon ways of means for moving said machine upon its ways, substantially as set forth.
4. The dynamo electric machine connected by a belt with its actuating motor and provided with guides in or upon the bottom of its bed plates in comb with ways upon which said bed plate rests substantially as set forth.

5. The combination with a dynamo-electric machine connected by a belt with its actuating motor, and mounted upon ways of screws or equivalents, devised for moving said machine upon said ways, substantially as set forth.

Filed
 Rejected
 Invented
 Rejected

June 28th 1883
 July 28th "
 Nov. 11, 1884
 April 14, "

Application 13584.



Electric Light Fixtures.

Claims

1. The combination with a single reflector of a number of electric lights arranged radially to each other beneath it, substantially as set forth.
2. The comb of a number of incandescing electric lamps, arranged radially with relation to each other, substantially as set forth.
3. The comb with a single reflector of a number of incandescing electric lamps, arranged radially beneath it, substantially as set forth.
4. The comb with a central support of a number of incandescing electric lamps projecting radially therefrom, substantially as set forth.
5. The comb with a central support of a number of incandescing electric lamps projecting radially therefrom, and a reflector carried by said central support, above said lamps, substantially as set forth.
6. The comb with a hollow support of circuit wires passing through said support to electric lights extending radially from said

support, substantially as set forth

7. The combination of a hollow support, of a distributing body, circuit wires passing within said pole to the interior of said body, and connection from said wires to incandescing electric lamps, projecting radially from said body, substantially as set forth.
8. The combination of a hollow pole, a distributing body placed near the top of said pole, incandescing electric lamps projecting radially from said body, circuit wires passing through said pole to said lamps, and a reflector carried by said pole above said lamps, substantially as set forth.
9. The combination of a hollow central support, a distributing body thereon, circuit wires within said support connected respectively to plates or rings within said body, and multiples are connections from said plates or rings to incandescing electric lamps projecting radially from said body, substantially as set forth.

Improvement in Electrical Generators

Claims.

1. A self contained electrical generator, composed essentially of the following parts, viz: a dynamo or magnet electric machine, a high speed steam engine, having an automatically variable cut-off, a direct connection between the shaft of said steam engine and that of said dynamo or magnet electric machines, and a supporting base or bed common both to said steam engine and said dynamo or magnet electric machine, the parts being arranged and combined, substantially as set forth.
2. A self contained electrical generator having in combination a dynamo or magnet electric machine, a high speed steam engine provided with a variable cut-off, and a spring governor varying such cut-off automatically, a direct connection between the shaft of said steam engine, and that of said dynamo or magnet electric machine, and a supporting base or bed common both to said steam engine and said dynamo or magnet electric machine, substantially as set forth.
3. In a self contained electrical generator of the character described, the combination with the common bed plate, of a high speed automatic cut-off steam engine, and a dynamo or magnet electric machine mounted thereon, and a compensating coupling connecting directly the shafts of the engine and dynamo or magnet electric machine, fully as set forth.
4. The combn with the high speed steam engine and the dynamo or magnet electric machine coupled directly together of the common sectional bed plate substantially as set forth.
5. The combn with the high speed steam engine and the horizontal arranged dynamo or magnet electric machine coupled directly together of the common sectional base provided with an elevated portion for the steam engine and a depressed portion for the generator, substantially as set forth.
6. The combn with the high speed steam engine and the horizontally arranged dynamo or magnet electric machine coupled directly together of the common sectional base provided with an elevated portion for the steam engine, a depressed portion for the generator, and a

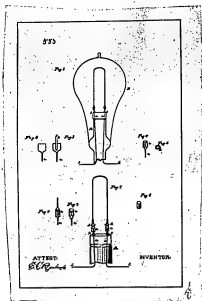
wing for the yokes of the generator magnet, substantially as set forth.

7. In a dynamo or magneto electric machine, one or both polar extensions of the field magnet made in mechanically separable sections, substantially as set forth.
8. In a dynamo or magneto electric machine, the back yokes of the field magnet made in mechanically separable sections, substantially as set forth.
9. In a dynamo or magneto electric machine, one or more extra magnet cores secured to separate sections of the polar extensions or back yokes, substantially as set forth.

Filed
Repealed

April 17/1883
June 20/ "

Application No 558



Incandescing Electric Lamps

Claims

1. In an incandescing electric lamp, the combination with a flat-irised leading-in wire, of a split cylinder formed integrally there-with substantially as set forth.
2. In an incandescing electric lamp, the combination with the split cylinder at the end of a leading-in wire, surrounding an end of the incandescing conductor, of means for producing close contact between said cylinder and said conductor, substantially as set forth.
3. In an incandescing electric lamp, the combination with the split cylinder at the end of a leading-in wire, of a washer ring or sleeve surrounding said cylinder, substantially as set forth.
4. The within described process consisting in flattening the end of the platina leading-in wire of an electric lamp, forming the flattened portion into a split cylinder, inserting the end of the incandescing conductor therein, and clamping the cylinder upon said ^{end} ~~base~~, substantially as set forth.

595

Filed	Oct. 10, 1888
Rejected	Dec. 17, "
Amended	Jan'y 13, 1889
Rejected	" 26, "
Amended	Mar. 29, "
Rejected	" 31, "

Application No 595.

Incandescing Electric Lamp.Claimed.

First: In an incandescing electric lamp, a clamp attached to the leading in wires for holding the end of the incandescing conductor, composed of non-springing arms, and a clamping sleeve or bend, substantially, as set forth.

Second: The clamp attached to the leading in wires, consisting of non-springing arms and a split clamping sleeve, substantially, as set forth.

Third: The combination in a clamp for the end of an incandescing conductor, of a part holding such end, and a split sleeve clamping such holding part, substantially as set forth.

Fourth: The clamp for the end of the incandescing conductor formed of a flat piece of metal doubled longitudinally upon itself, substantially, as set forth.

Fifth: The combination with the clamp consisting of a flat piece of metal doubled longitudinally upon itself, of the split clamping sleeve, substantially as set forth.

Sixth: The clamp for the incandescing conductor, fused to the end of a leading in wire, substantially, as set forth.

Seventh: The combination with a leading in wire, of the flat doubled piece of ^{fused to said wire at the binding} point of said piece, substantially, as ^{set} for the purpose set forth.

Eighth: The combination with the carbon conductor having its ends plated with metal, of the clamp compressed upon the same, substantially, as set forth.

Ninth: The combination with the plated end of the carbon, of the clamp composed of two metallic arms ^{and} the split clamping sleeve, substantially, as set forth.

606

Application No 606

Dated Dec 12, 1883.
Letter from Office Jan'y 18, 1884.
Interference with Wheeler
Declared Feb'y 8, 1884.

Systems of Electrical Distribution.

Claims.

First: The method herein described, for disconnecting the generator in an electrical system of the character set forth, consisting in reducing the current generated by a machine before breaking its circuit.

Second: The method herein described, for disconnecting the generator in an electrical system of the character set forth, consisting in reducing the current generated by a machine until such machine begins to become a motor, before breaking its circuit.

611

Entered
Rejected

Jan'y 24, 1884.
Mar. 7, "

Application N^o 611.

Dynamo Electric Machine

Second

First—The combination with the adjustable current collectors of a dynamo electric machine of an indicator constantly showing their position, substantially as set forth.

Second—The combination with the adjustable current collectors of a dynamo electric machine of an indicator graduated in current units & raised according to the position of said current collectors, substantially, as set forth.

Third—The combination in a dynamo electric machine of a brush carried by the adjustable arm which holds the current collectors and a scale over which said brush travels, substantially, as set forth.

Fourth—The method of ascertaining the load upon a dynamo electric machine at any time, consisting in constantly indicating the position of the adjustable current collectors, substantially, as set forth.

614First
RejectedJuly 24, 1884
July 11,

Application No 614

Electrical ConductorsClaims.

First: The combination with an electrical conductor and an insulating covering, of a covering of metallic foil, substantially as set forth.

Second: The combination with an electrical conductor of an insulating covering, a covering of metallic foil, and an outer retaining covering, substantially as set forth.

Third: The combination with an electrical conductor of a covering consisting of alternate layers of insulating material and metallic foil, substantially as set forth.

Fourth: The combination with an electrical conductor, of an insulating covering, a covering of lead or tin foil, another insulating covering, a covering of copper or other foil of high melting point, and a retaining covering, substantially as set forth.

Step 2. The combination with an electrical conductor, of one or more layers of insulating tape wound with edges overlapping, one or more layers of metallic foil similarly wound ^{and} an outer retaining covering, substantially as set forth.

616

Dated

April 5th 1884Application N^o 616.Incandescing Electric LampClaims.

First: The incandescing carbon filament for an electric lamp provided with a coating reflective of light, substantially as set forth.

Second: The process of coating a carbon filament with silicon or equivalent material consisting in electrically volatilizing such material in a vacuum which contains the filament, substantially as set forth.

619

Filed April 5, 1884.

Application No 619.

Dynamos Electric Machines.Claims

First: In a dynamo electric machine two or more armatures in multiple arc (magnetically) in the same magnetic field, substantially as set forth.

Second: In a dynamo electric machine two or more armatures placed between the same field magnet poles, substantially as set forth.

Third: In a dynamo electric machine the combination of a single field magnet and two or more armatures in multiple arc (magnetically) between its poles, substantially as set forth.

Fourth: The combination with a single field magnet of two or more armatures of equal capacity, supplying working circuits substantially as set forth.

Fifth: The combination with a single field magnet of two or more armatures between its poles extension

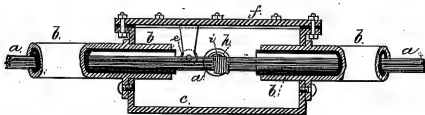
connected electrically in series, main conductors extending therefrom, one or more compensating conductors, and translating devices in multiple series, substantially as set forth.

Patent Application Drawings

Most of the drawings in this set are in the form of tracings. They are organized according to case number and relate primarily to electric lighting, electric railways, ore milling, and telegraphy. Only those drawings that have been identified as being part of abandoned or rejected applications have been filmed. The drawings accompanying Edison's successful patent applications can be found in Thomas A. Edison Papers Microfilm Edition, reels 1 and 2.

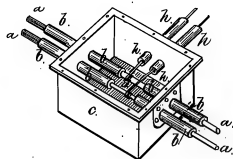
Case 179

Fig. 1.



Case No. 179.

Fig. 2.

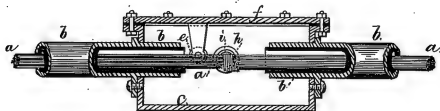


J. A. Edison

Abandoned

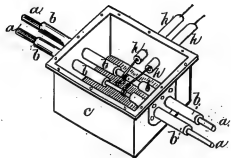
179

Fig. 1.



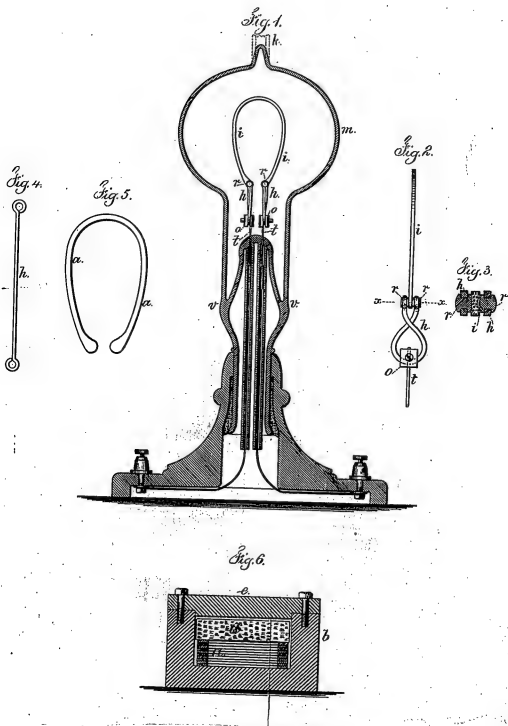
Case No. 79.

Fig. 2.



T. A. Edison

Drawing Case 187



CASE. 215.

Fig. 1.

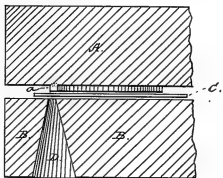


Fig. 2.



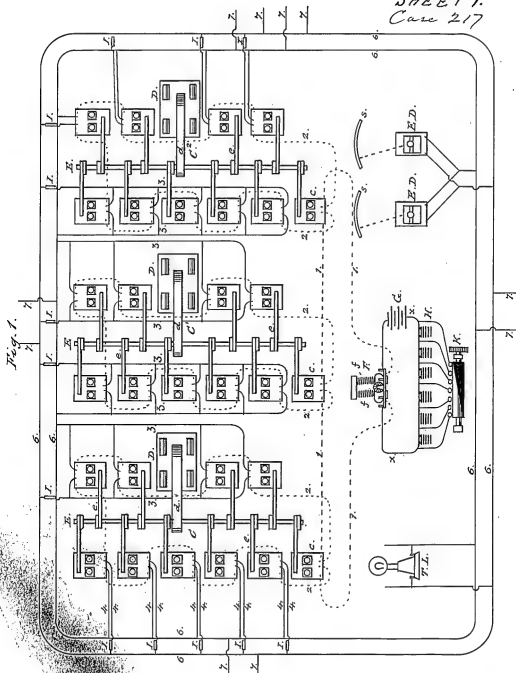
Attest:

Saul D. Mott
James A. Payne

Inventor

J. A. Edison
per Byron W. Miller
Atty.

SHEET 1.
Case 217



Attest,
H. W. Howard
Notary Public

Inventor;
T. A. Edison
per. Byer and Wilbur

Attys.

Diagram illustrating a Wheatstone bridge circuit for measuring the resistance of a coil (T.L.). The bridge consists of four arms: one with a variable resistor (rheostat) labeled 'C', one with a fixed resistor labeled 'C'', one with a standard resistor labeled 'Z', and one with the coil labeled 'T.L.'. A galvanometer 'G' is connected between the junctions of the resistors. A battery 'B' is connected to the bridge. The diagram also shows a detailed view of the coil 'T.L.' with its terminals and a label 'C.C.'.

Inventor;
T.A. Edison
per Syer and Wilber
Attys.

Fig. 7.

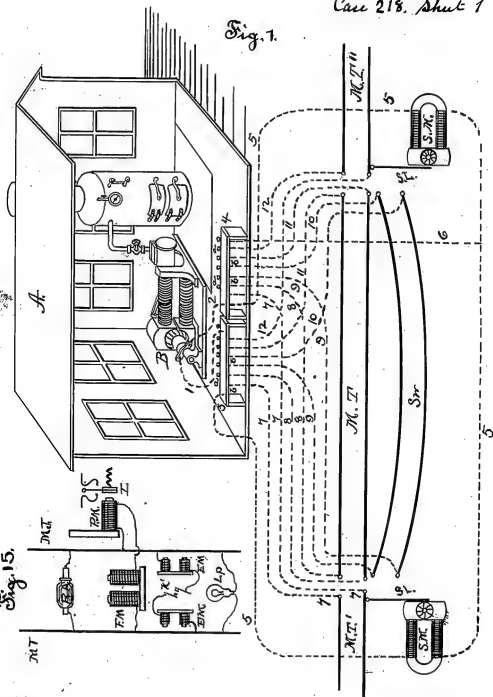
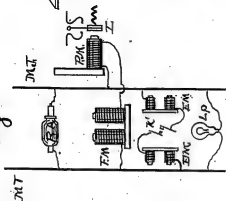


Fig. 15.



Attest -
W. D. Mott

Inventor -
Thos. A. Edison

Case 218, Sheet 2

Fig. 2.

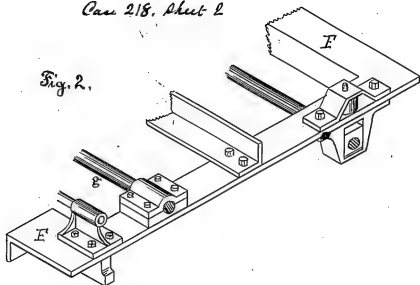
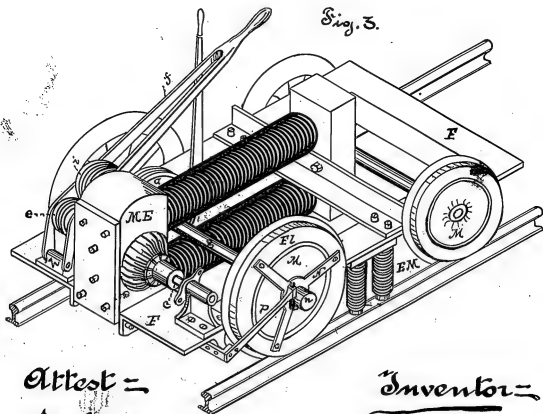


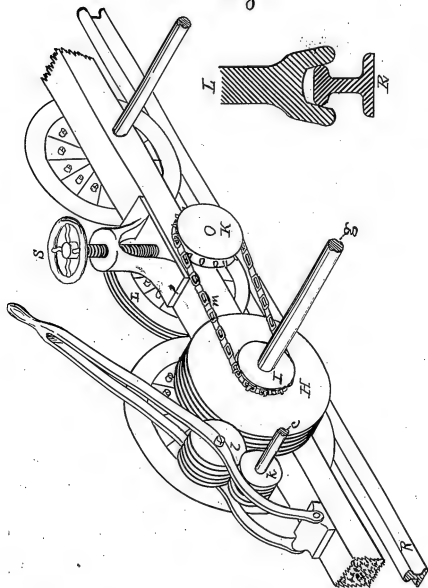
Fig. 3.



Attest =
D. D. Mott

Inventor =
Thos. A. Edison

Fig. 4.



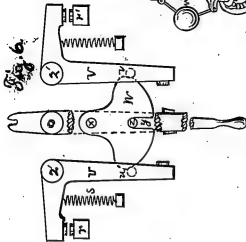
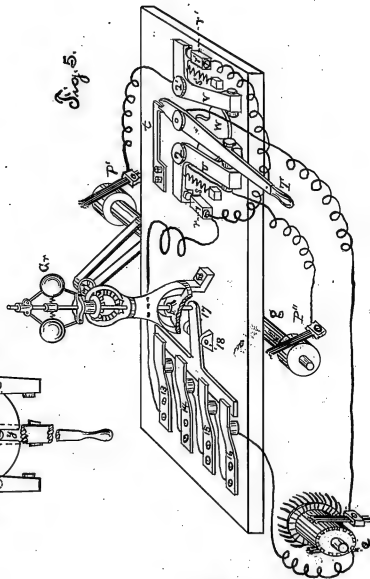
Attest =
D. D. Mott

Inventor =
Thomas A. Edison

Sig. 14.



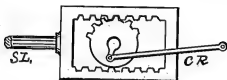
Sig. 5.



Attest =
D. D. Mott

Inventor =
Thos. A. Edison

Fig. 7.



Case 218. Sheet 5

Fig. 9.

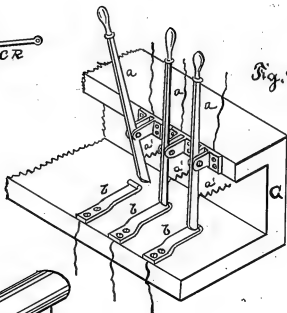


Fig. 10.

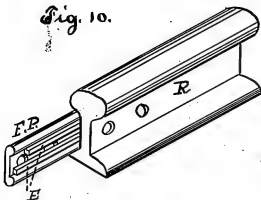
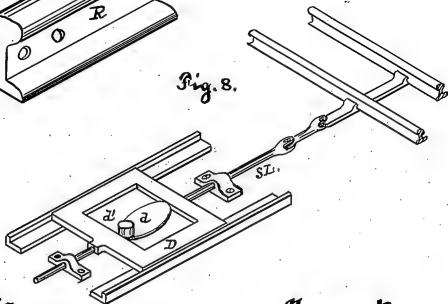


Fig. 8.



Attest:
D. W. Mott

Inventor:
Thos. A. Edison

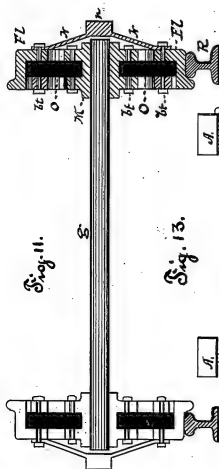


Fig. 11.

Fig. 13.

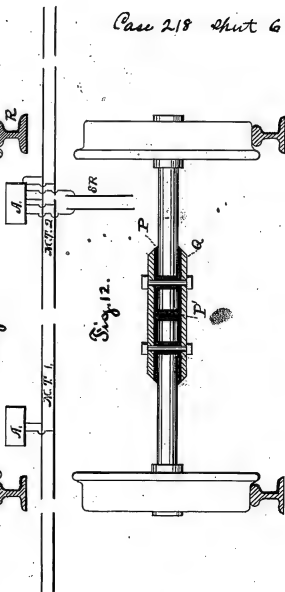
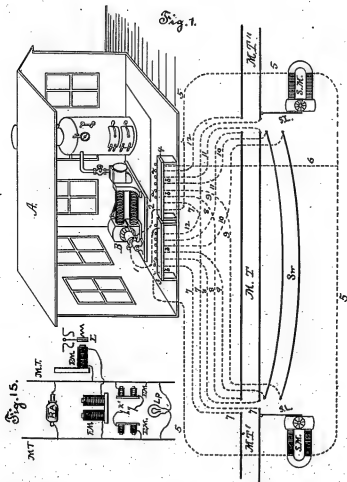


Fig. 12.

Attest—
S. D. Mott

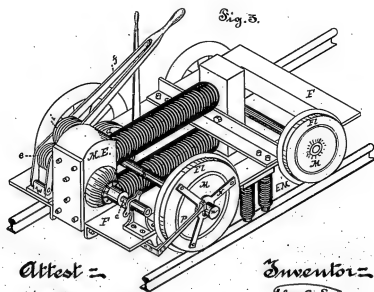
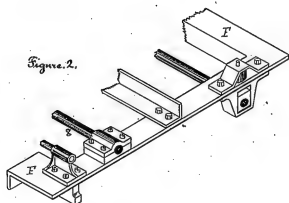
Inventor—
Thos. A. Edison

Case 218



Attest =
 D. S. Mott.
 Notary.

Inventor =
 T. A. Edison
 by V. M. Mott
 Atty.



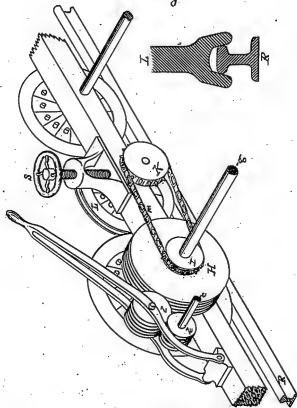
Attest =

D. D. Mohr
Notary

Inventor =

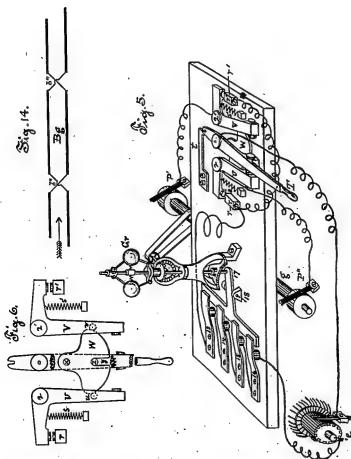
Thos. A. Edison
per Roger S. Miller
Atty.

Fig. 4.



Attest—
 S. D. Mott
 Notary

Inventor—
 Thos. A. Edison
 per Ogden & Heller
 Attys.



Attest =

D. D. Mott

Notary

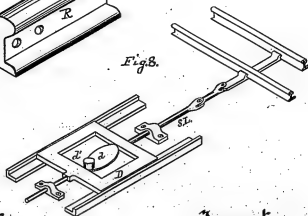
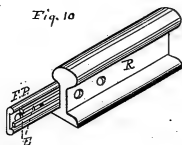
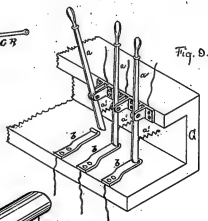
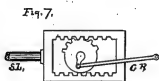
Inventor =

Thos. A. Edison

per J. W. & J. M. Mott

Attys.

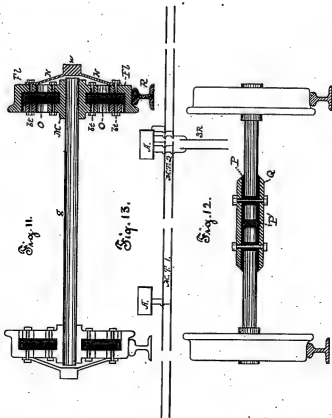
Case 218



Attest:-
D. D. Mott
Hobbs

Inventor:-
Thos. A. Edison
per J. W. Miller
Atty.

Case 218



Attest:
D. Mott
H. Hall

Inventor:
Thos. A. Edison
By J. S. Miller
Att'ys.

Case 232.

Fig. 1.

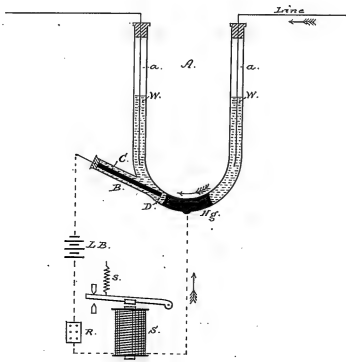


Fig. 2.



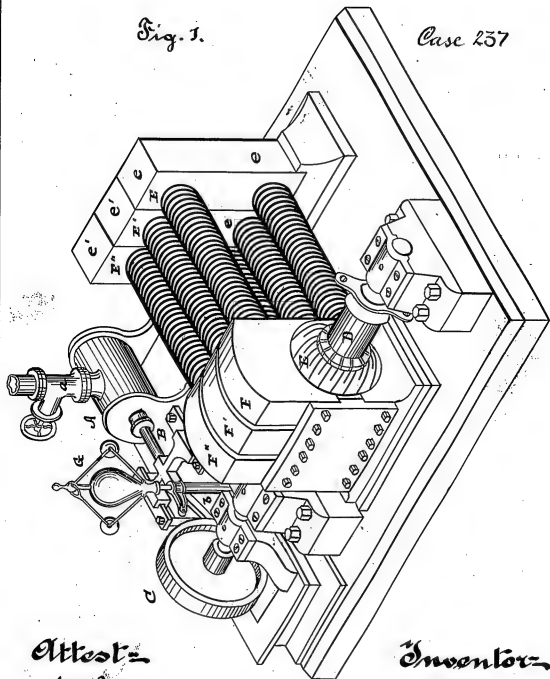
Attest;
W. Howard
James A. Barnes

Inventor;
T. A. Edison per
Dyer & Miller

Attys.

Fig. 1.

Case 237



Attest:-

D. D. Mott

Inventor-

Thos. A. Edison

Fig. 1.

Case 244

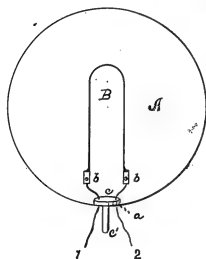
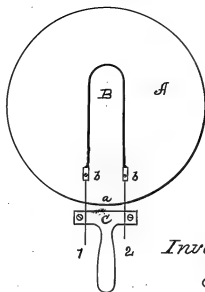


Fig. 2.



Witnesses:

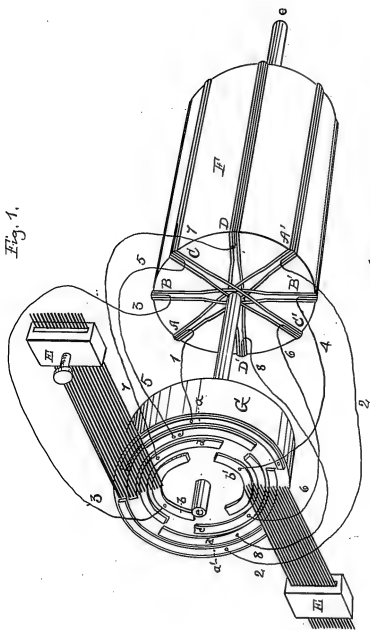
D. D. Mott

Inventor:

T. H. Edison.

Attorneys.

Fig. 1.



Case 248

Witnesses,

D. B. Mott

Inventor:

Thos. A. Edison

Case 249

Fig. 1.

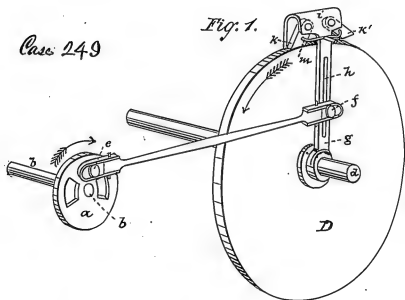
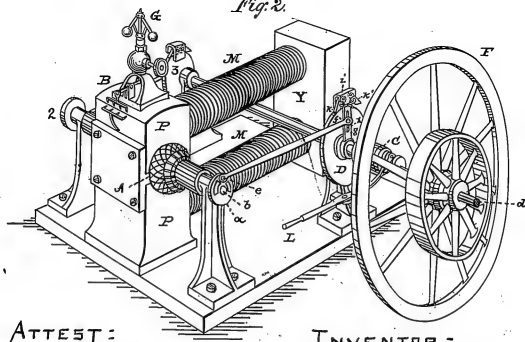


Fig. 2.



ATTEST:

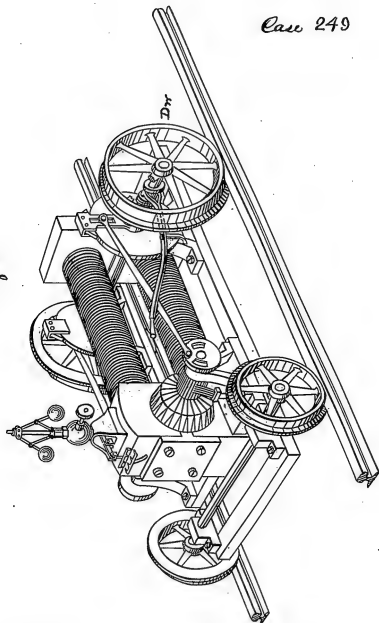
D. D. Mott

INVENTOR:

Thos. A. Edison

Case 249

Fig. 3.



Witnesses:

Charles Praetig

D. D. Mott

Inventor:

T. H. Edison

Attorneys.

Case 249.

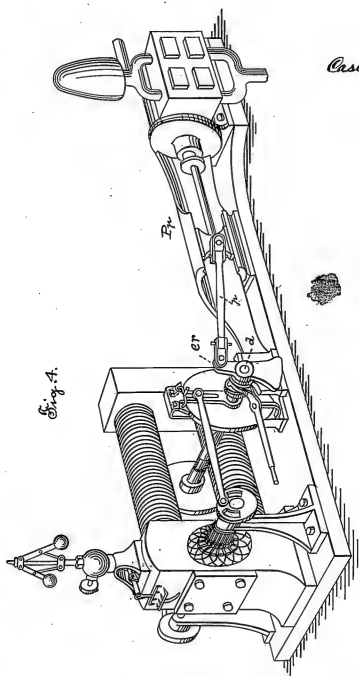


Fig. 4.

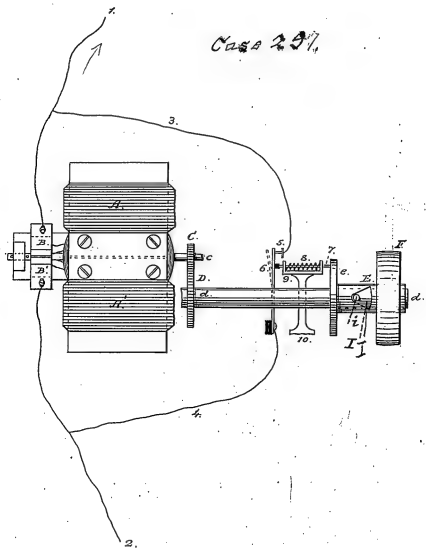
ATTEST =

D. W. Mott

INVENTOR =

Thos. A. Edison

Casa 297



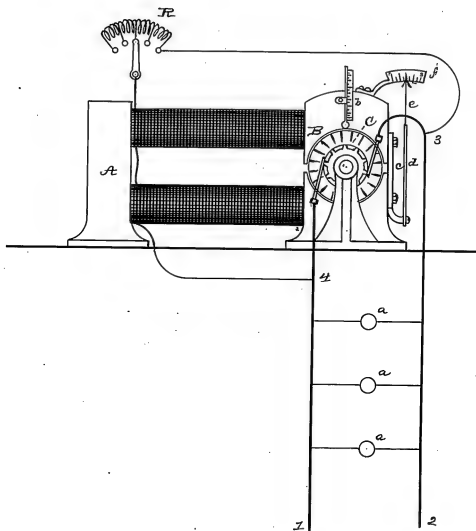
Attest,
 J. W. Howard
 C. D. Mott

Inventor,
 T. A. Edison

per

Atty's.

Case 253

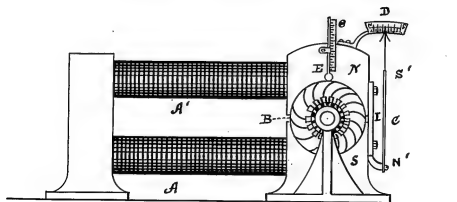


ATTEST:

O. S. Rowland

INVENTOR:

Case 253



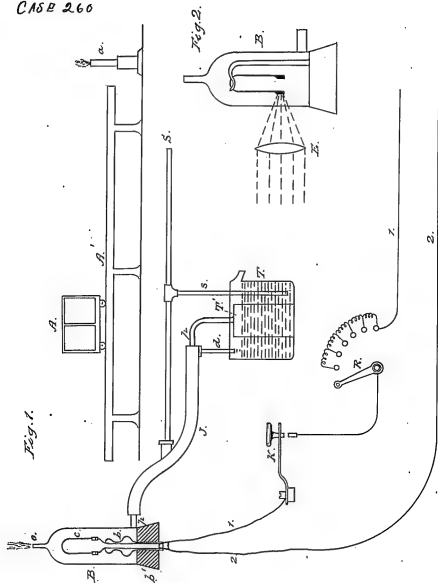
Attest:

S. D. Kott

Inventor:

Thos. A. Edison

CASE 260



Attest=

D. W. Mott

Chas. W. Howard

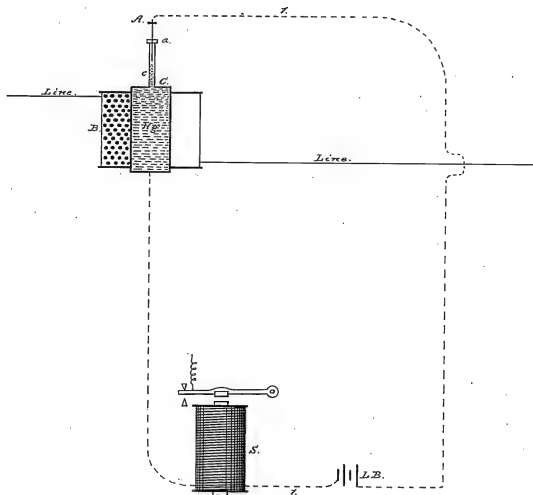
Inventor=

Thos. A. Edison

per Dyer & Miller

Atty's

Case 273.



Attest;
C. W. Howard

D. D. North

Inventor;
T. A. Edison
per

Attys.

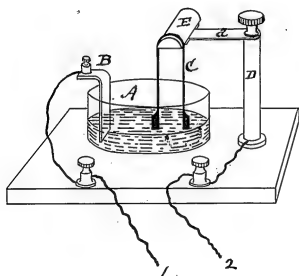


Fig. 1.

Case 278

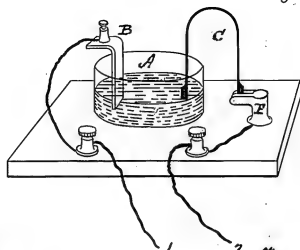


Fig. 2.

Attest:

D. D. Mott

Inventor:

Thos. A. Edison

Case No. 311.

Abandoned

Fig. 1.

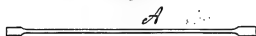


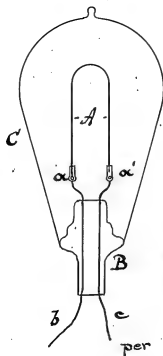
Fig. 2.



Fig. 3.



Fig. 4.



Attest

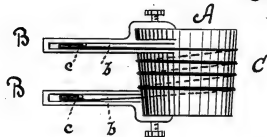
S. D. Mott

Inventor

J. A. Edison

Atty.

Fig. 1.



Case 323

Fig. 2.

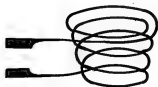
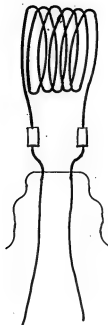


Fig. 3.



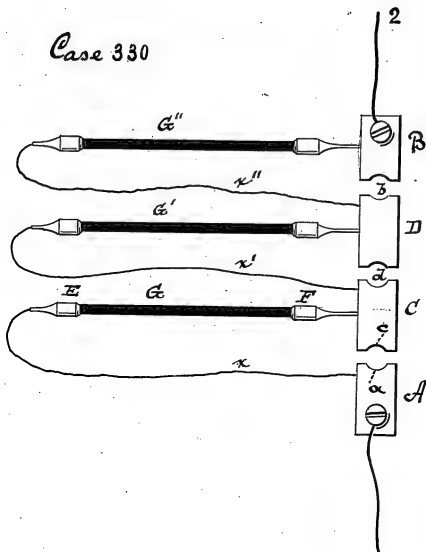
WITNESSES:

S. D. Mott

INVENTOR:

T. A. Edison

Case 330



Attest

D. W. Mott

Inventor

T. A. Edison

Fig. 2.

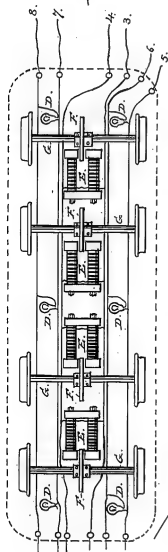
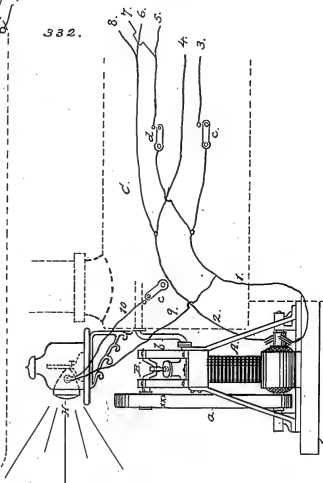
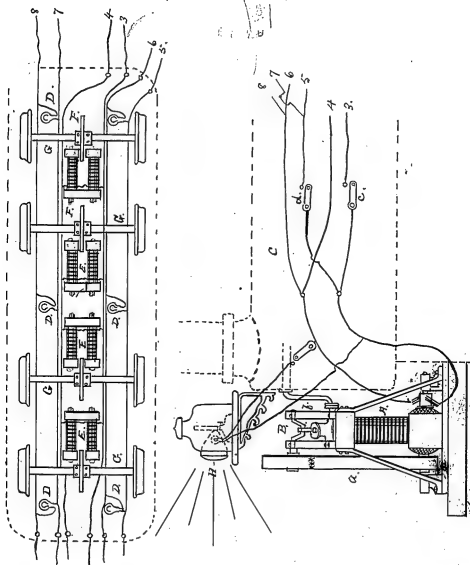


Fig. 2.



Case 332



Attest
D. D. Mott
W. J. Gayett

Inventor:
Thos. A. Edison
Dyer Miller

Fig. 1.

Case 339.

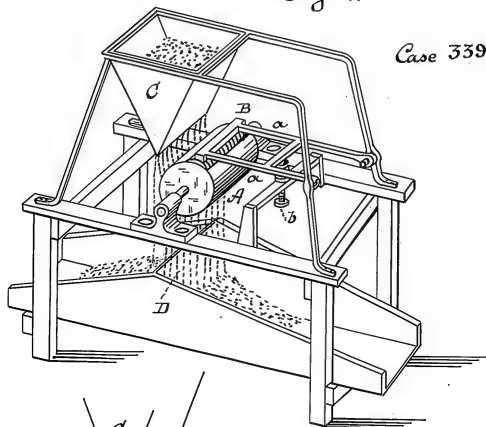
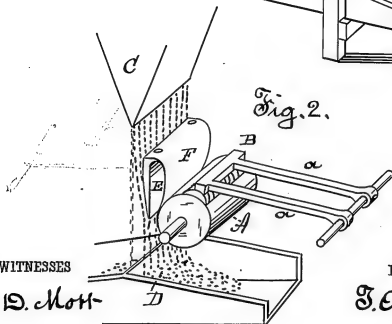


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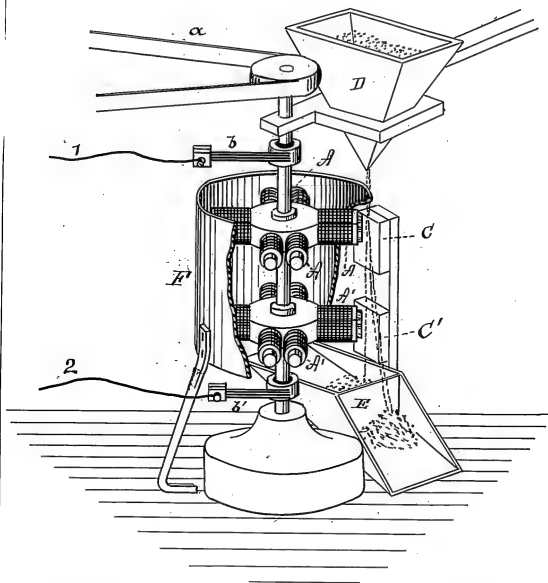
WITNESSES

D. D. Mott

INVENTOR

T. A. Edison

Case 340



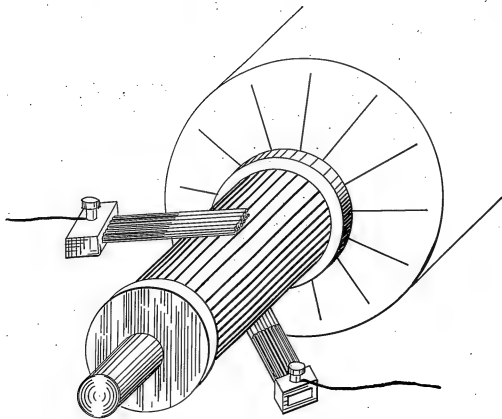
WITNESSES

D. W. Mott

INVENTOR

T. A. Edison

Case 342



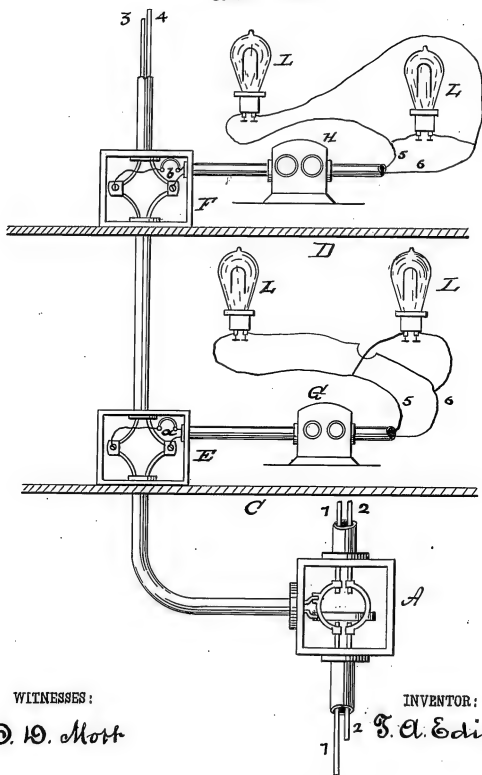
WITNESSES:

D. D. Mott

INVENTOR:

J. A. Edison

Case 345.



WITNESSES:

D. W. Most

INVENTOR:

T. A. Edison

852

Fig. 1.

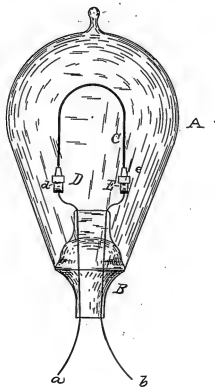
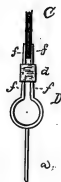


Fig. 2.

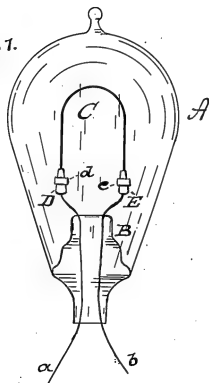


Witnesses:
J. B. Clark.

Inventor:

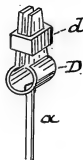
Attorney.

Fig. 1.



352
Case ~~346~~

Fig. 2.



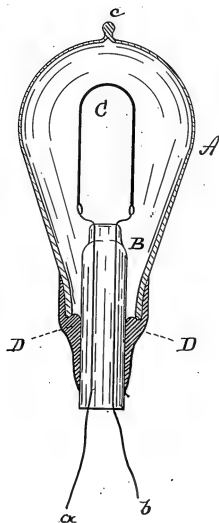
WITNESSES:

D. W. Mott

INVENTOR:

T. A. Edison

Case. 363.



WITNESSES:

D. D. Mott

INVENTOR:

T. A. Edison

Fig. 1.

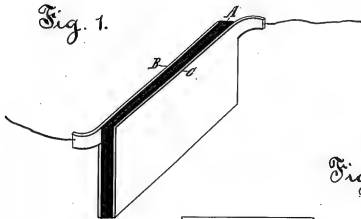


Fig. 2.

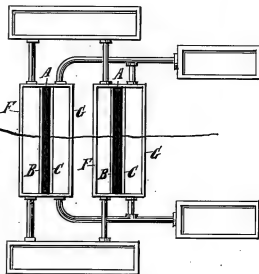
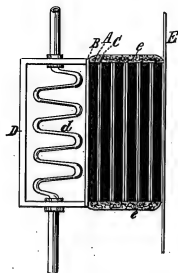


Fig. 3.



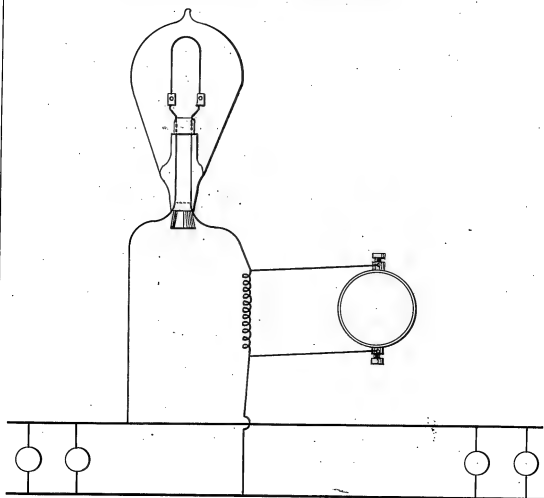
WITNESSES:

D. D. Mott

INVENTOR:

T. A. Edison

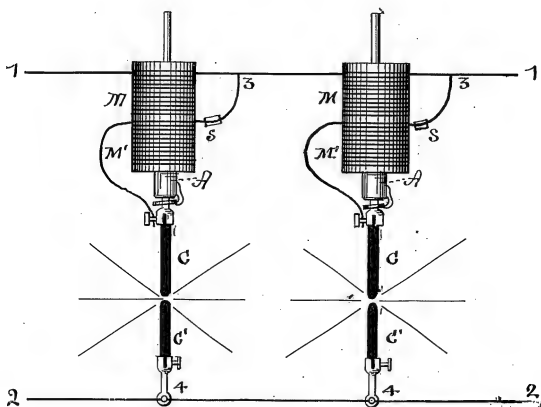
Case 367



WITNESSES:

INVENTOR:

Case 370



WITNESSES:

D. D. Mott

INVENTOR:

J. A. Edison

373

Fig. 1.

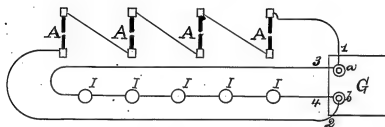
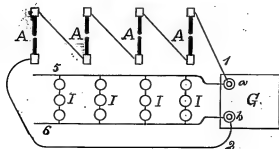


Fig. 2.



WITNESSES:

E. C. Rowland

INVENTOR:

Case 373.

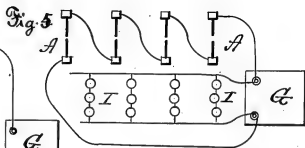
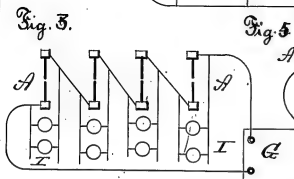
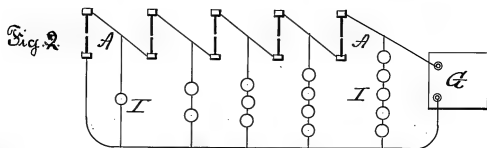
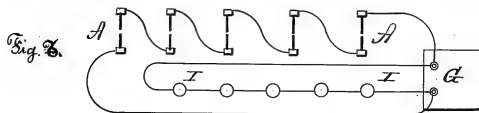
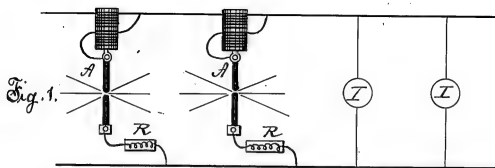
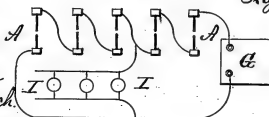


Fig. 4

WITNESSES:

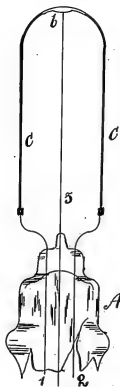
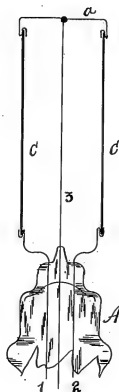
D. D. Mott
Thomas E. Birch



INVENTOR:

T. A. Edison

Case 578.



WITNESSES:

D. D. Mott
Thomas E. Birch

INVENTOR:

J. A. Edison

Case 379.

Fig. 1.

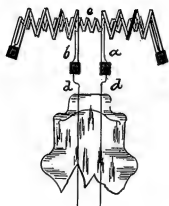
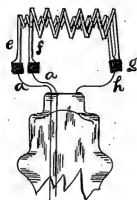


Fig. 2.



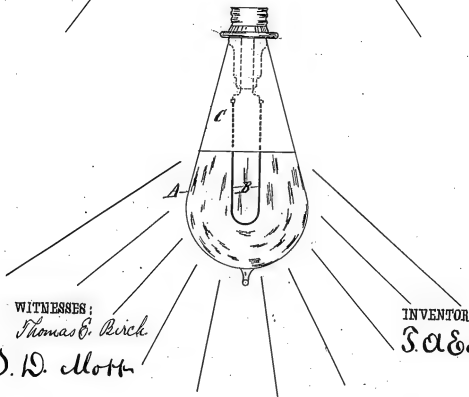
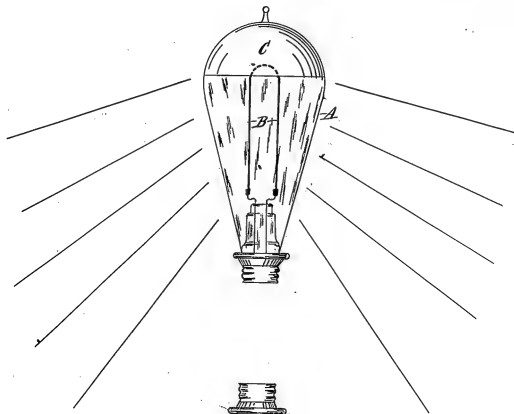
WITNESSES:

O. D. Mott
Thomas E. Birch

INVENTOR:

J. A. Edison

Case No 384.



WITNESSES:

Thomas E. Birch

D. D. Mott

INVENTOR:

T. A. Edison

Case 3947

Fig. 1.

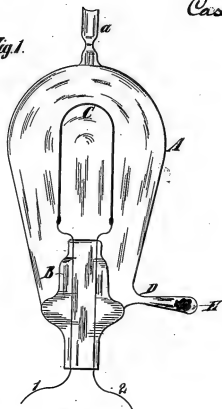
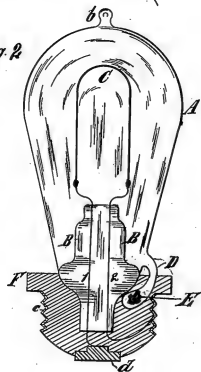


Fig. 2.

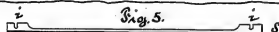
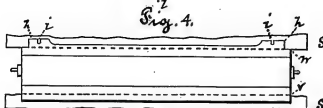
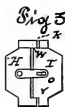
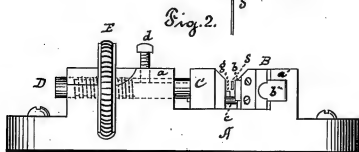
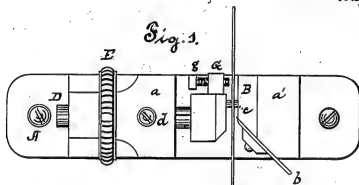


WITNESSES:
Thomas E. Birch.

S. D. Mott

INVENTOR:
S. A. Edison

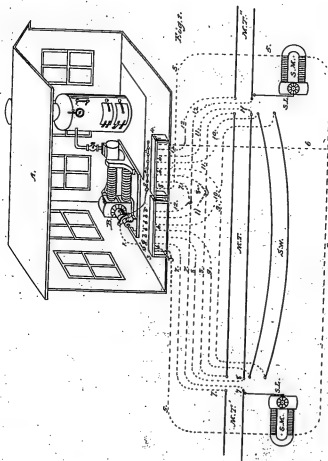
Case 401
429



Attest:
D. B. Mott

Inventor
Thos. A. Edison

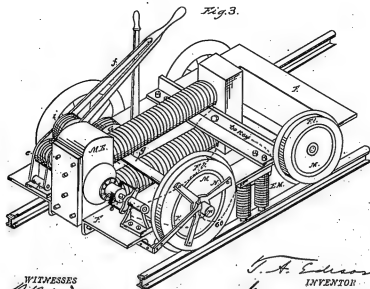
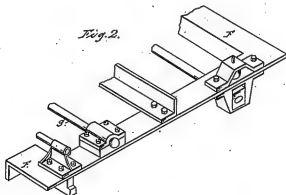
403



WITNESSES
R. B. Miller
J. H. Hall

J. A. Edison
 INVENTOR
per J. F. Miller
 Attorney

(403)



WITNESSES

P. B. Meier
J. H. Hall

J. H. Hall

T. A. Edison
INVENTOR

INVENTOR

J. F. Meier
Attorney

Attorney,

403

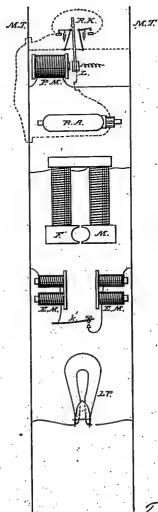
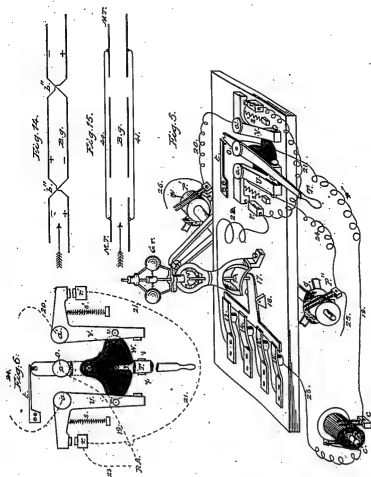


Fig. 4.

Witnesses,
 G. H. Howard
 J. H. Hall

Inventor,
 J. A. Schenck
 J. Miller
 Atty.

403

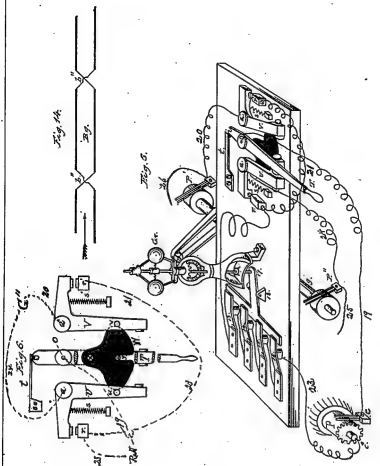


Witnesses
 J. M. Edwards
 J. Hall

Inventor,
 J. N. Edwards
 J. Miller Atty

403

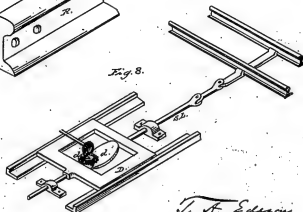
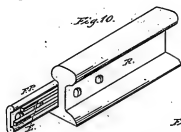
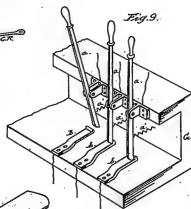
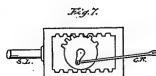
Cancelled Aug. 2. 82



WITNESSES
R. B. Miller
J. H. Hall

J. A. Edison
INVENTOR
For J. F. Miller
Attorney

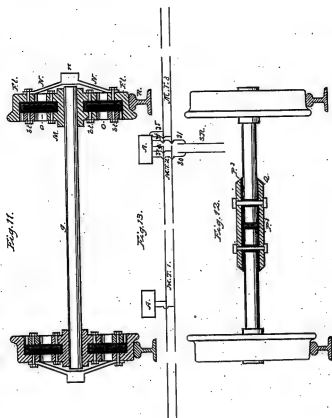
403



WITNESSES
R. B. Milner
J. H. Hall

T. F. Edman
 INVENTOR
J. F. Milner
 Attorney

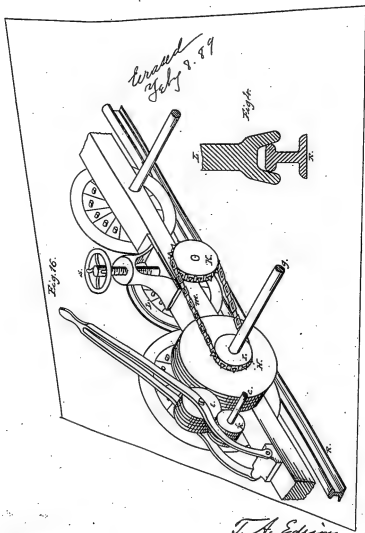
(403)



WITNESSES
J. A. Hall
J. A. Hall

T. A. Edison
 INVENTOR
J. F. Milner
 Attorney

403

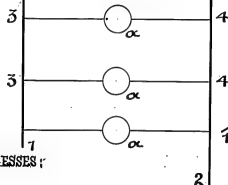
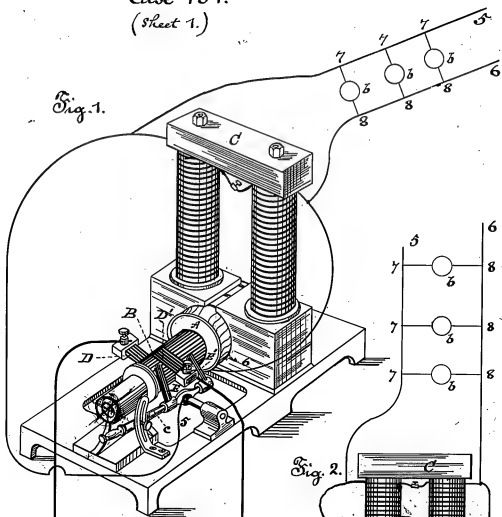


WITNESSES
R. B. Butler
J. H. Hall

T. A. Edison
 INVENTOR
J. F. Miller
 Attorney

Case 404.
(Sheet 1.)

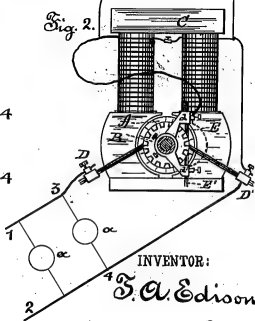
Fig. 1.



WITNESSES:

O. D. Mott

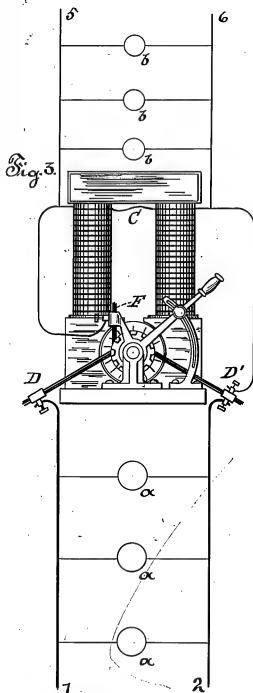
Fig. 2.



INVENTOR:

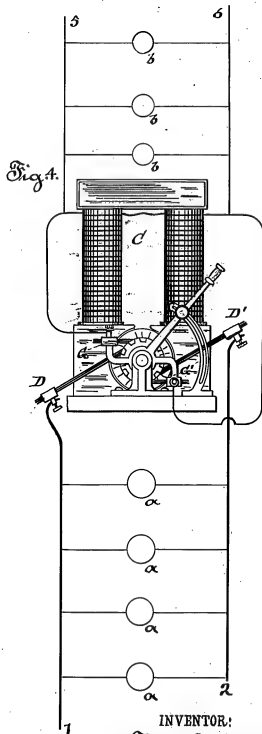
T. A. Edison

Case 404
(Sheet 2)



WITNESSES:

D. D. Mott



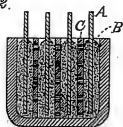
INVENTOR:

T. A. Edison

Fig. 1.



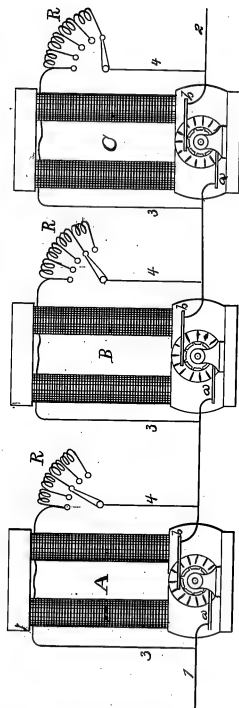
Fig. 2.



WITNESSES:

E. C. Howland

INVENTOR:



WITNESSES:

E. C. Rowland,

INVENTOR:

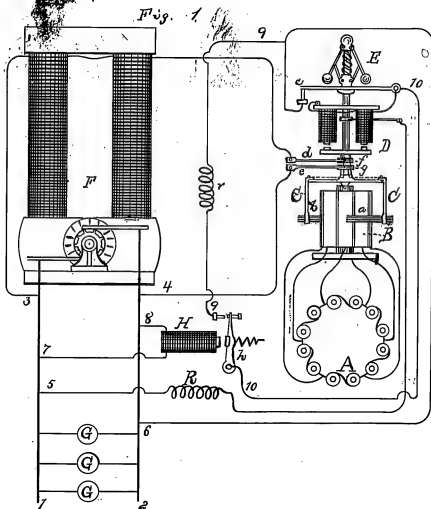
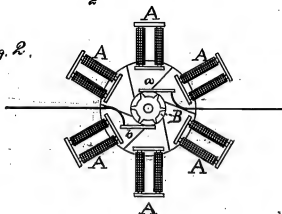


Fig. 2.



WITNESSES:

C. C. Rowland

INVENTOR

Fig. 1.

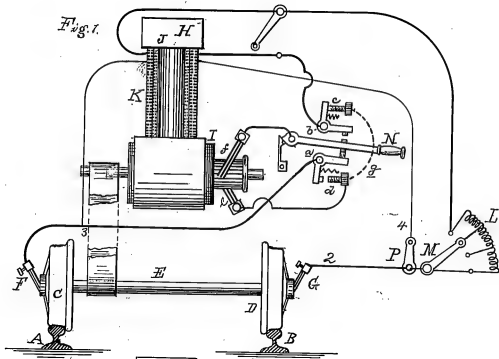
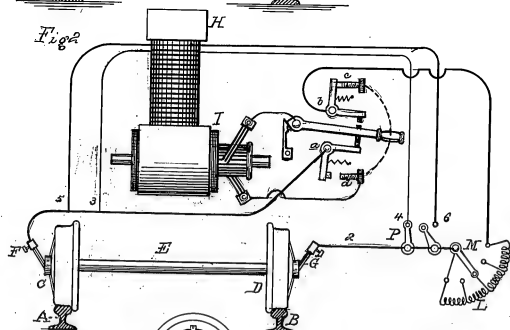


Fig. 2.



WITNESSES:

D. D. Mott

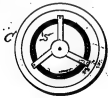


Fig. 3.

INVENTOR:

S. A. Edison

Fig. 7.

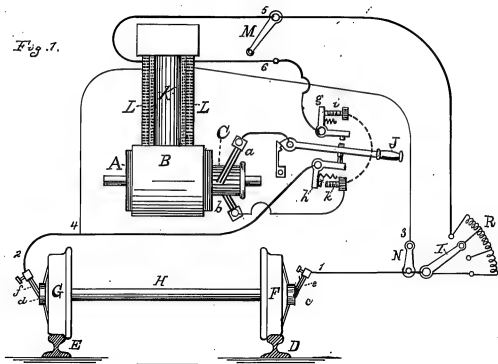
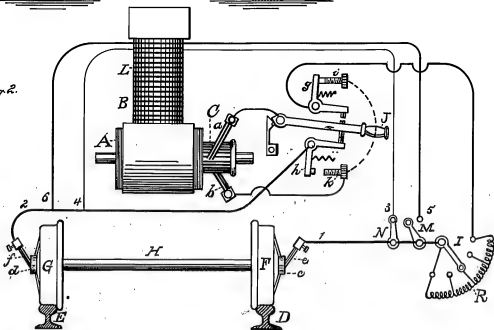


Fig. 2.

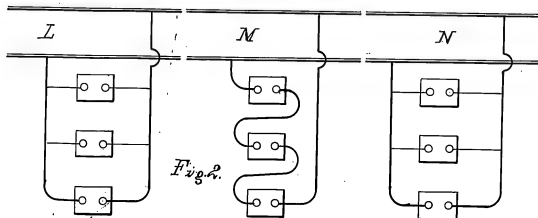
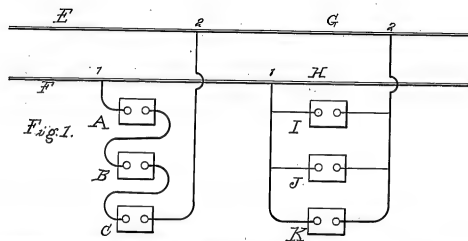


WITNESSES:

D. D. Mott

INVENTOR:

S. A. Edison



WITNESSES:

E. C. Rowland
S. B. Mott

INVENTOR:

T. A. Edison

Fig. 1.

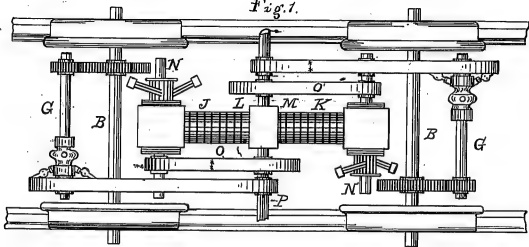


Fig. 2.

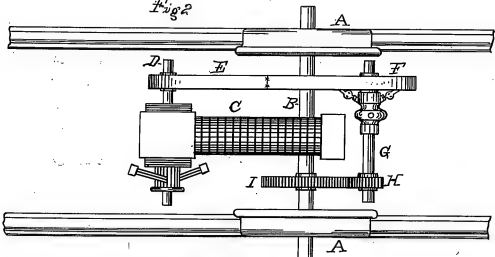
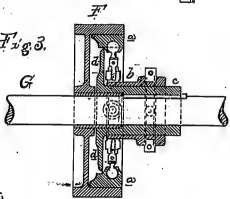


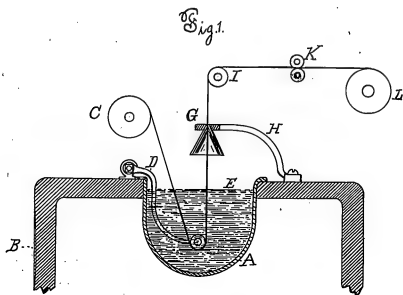
Fig. 3.



WITNESSES:

C. C. Rowland,

INVENTOR.



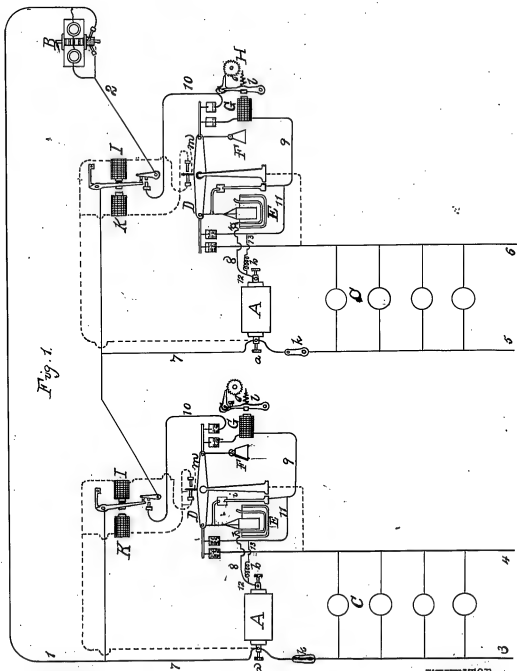
WITNESSES:

E. C. Rowland

INVENTOR:

448

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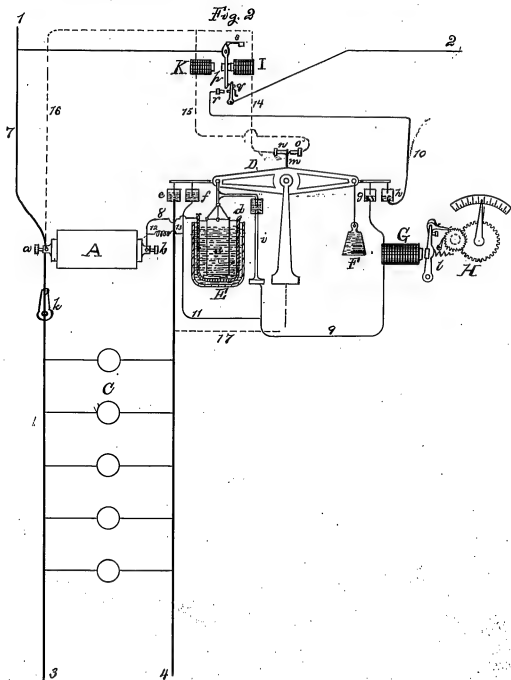


WITNESSES:

C. C. Rowlands

INVENTOR.

448
Sheet 2



WITNESSES:
E. C. Rowland

INVENTOR:

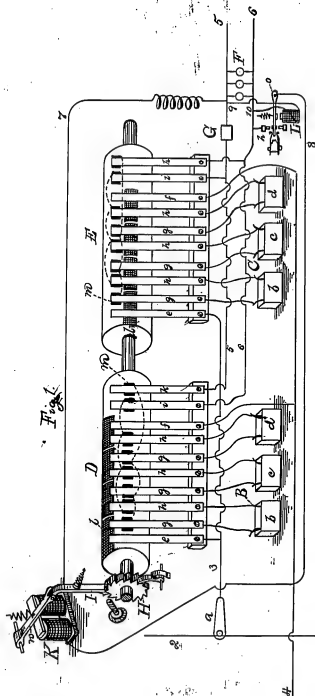


Fig. 1.

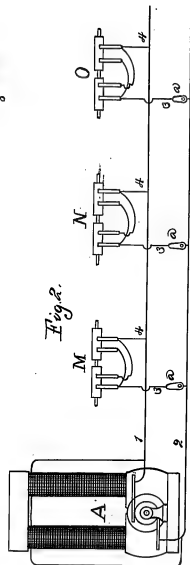
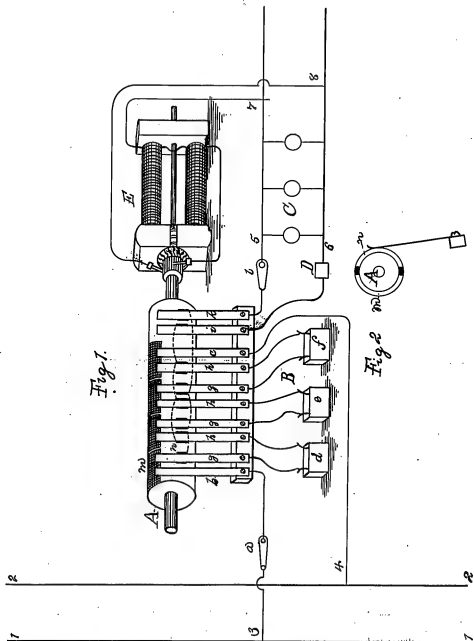


Fig. 2.

WITNESSES:
E. C. Howland

INVENTOR:

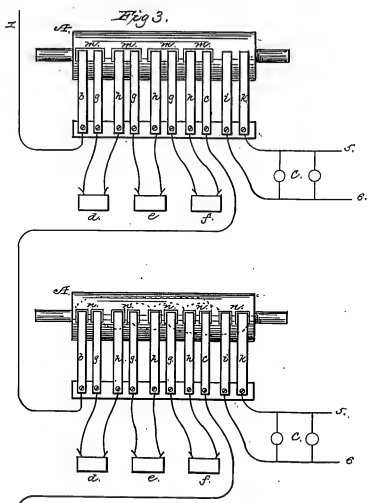
451



WITNESSES:
E. C. Rowland

INVENTOR:
Thomas A. Edison

4151



Witnesses,
J. C. Clark.

Inventor,

Attorney.

452

Fig. 1.

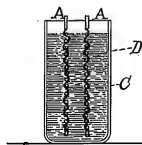
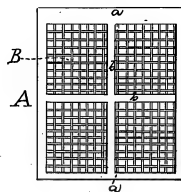


Fig. 2.

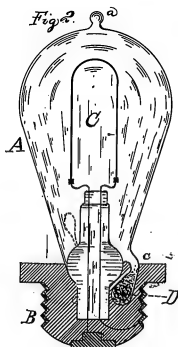
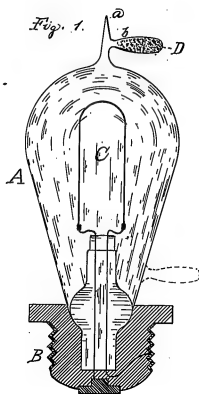


WITNESSES:

C. C. Howland

INVENTOR:

453



WITNESSES:
E. C. Rowland

INVENTOR:

Fig. 1

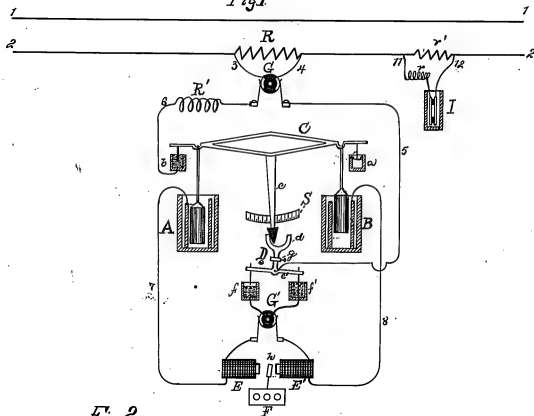
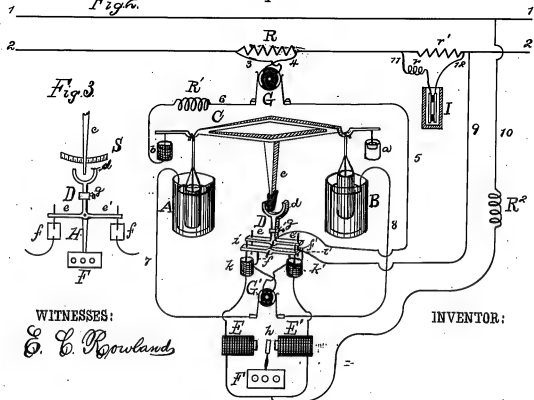


Fig. 2



WITNESSES:

E. C. Rowland

INVENTOR:

454

Fig 3

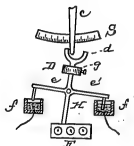


Fig. 4.

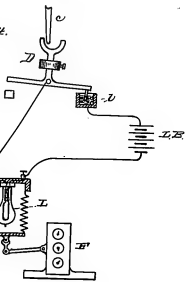
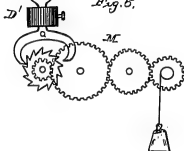


Fig. 5.



ATTEST:
C. Rowland

INVENTOR,

455

Fig. 1.

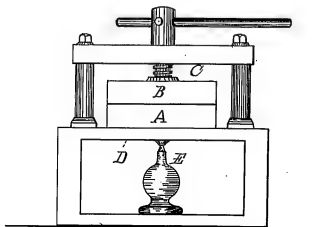
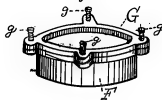


Fig. 2.

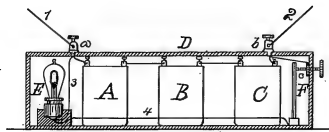


WITNESSES:

E. C. Howland

INVENTOR:

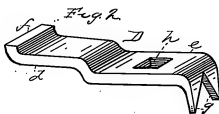
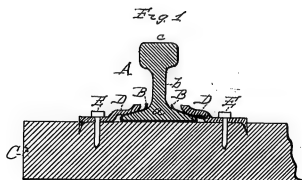
458



WITNESSES:

E. C. Rowland

INVENTOR:

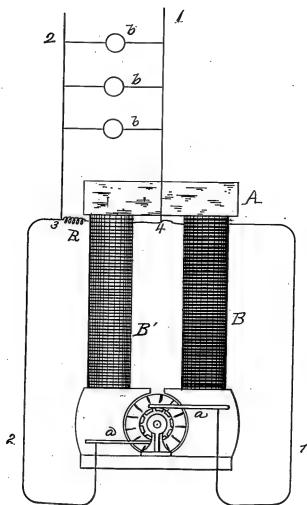


WITNESSES:

E. C. Rowland,

— — INVENTOR;

476

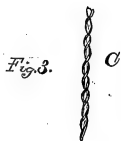
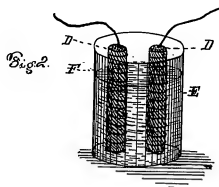
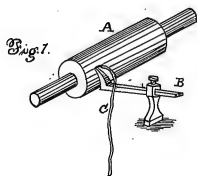


WITNESSES:

E. C. Rowland

INVENTOR:

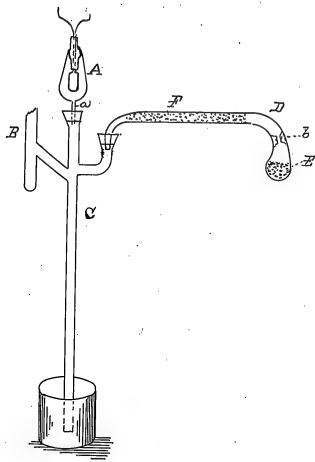
480



WITNESSES:
E. C. Howland

INVENTOR: ✓

482

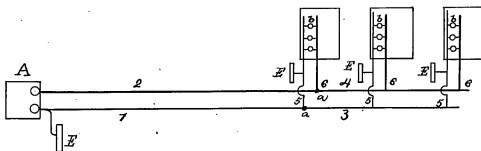


WITNESSES:

Edw. C. Rowland

INVENTOR:

484

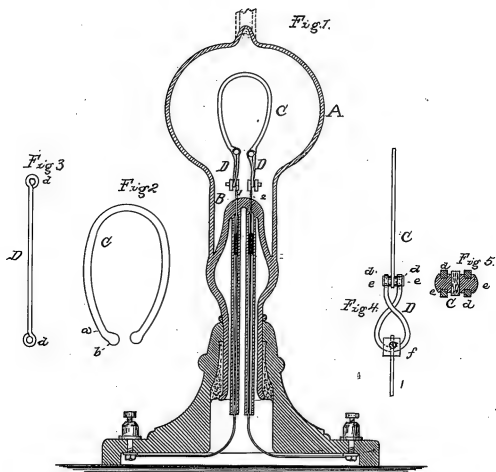


WITNESSES:

E. C. Rowland

INVENTOR:

485

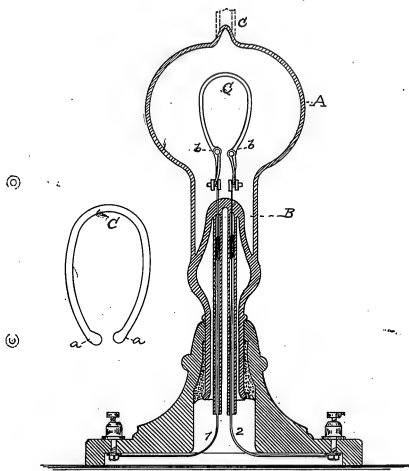


WITNESSES:

Edw. C. Rowland

INVENTOR:

486



WITNESSES

E. S. Rowland

INVENTOR

Fig. 1.

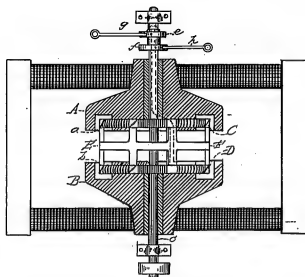


Fig. 2.

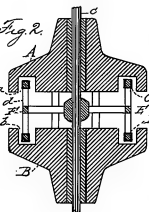


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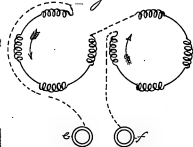


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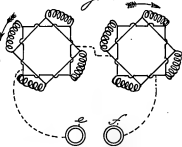


Fig. 3.

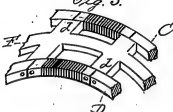
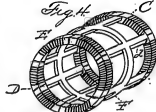


Fig. 4.



ATTEST:
Edw. C. Rowland

INVENTOR:

Fig 7.

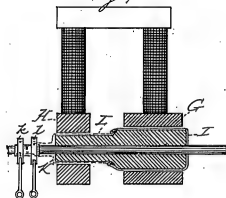


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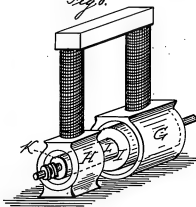
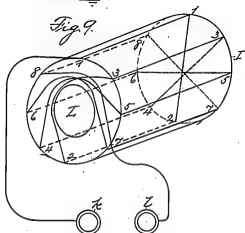


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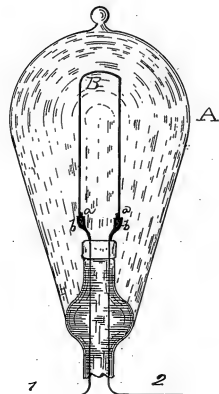


ATTEST:

INVENTOR:

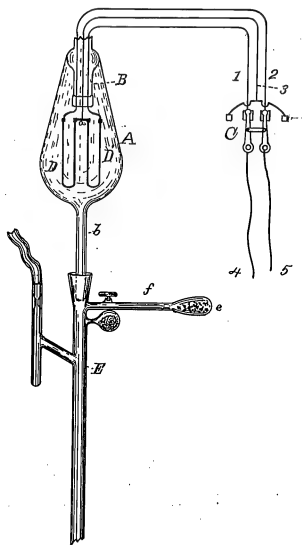
10/100

504



ATTEST
E. C. Rowlands

INVENTOR



ATTEST:

E. C. Rowland

INVENTOR:

Fig. 1.

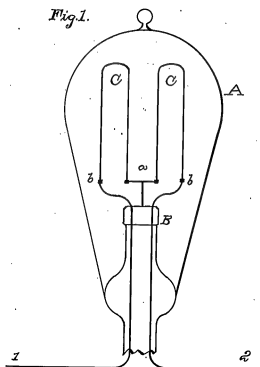
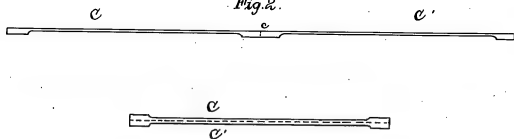


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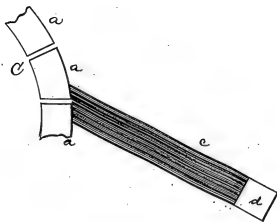
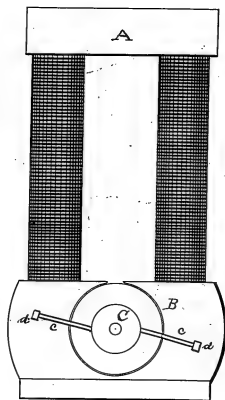


ATTEST

Geo. E. Howland

INVENTOR

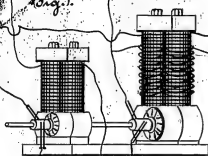
518



WITNESSES:

INVENTOR:

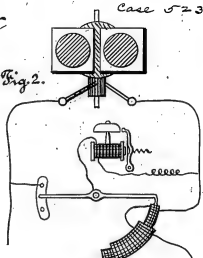
Fig. 1.



Abandoned

Caveat

Fig. 2.



Case 523

Fig. 3.

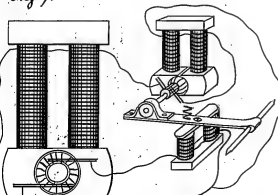


Fig. 4.

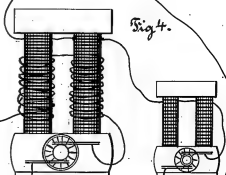


Fig. 5.

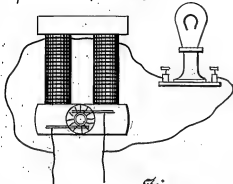


Fig. 6

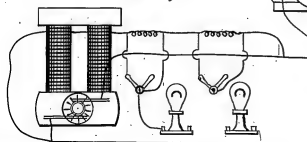
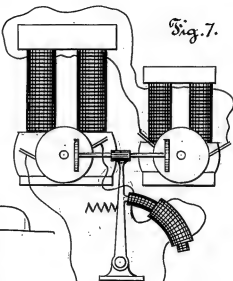


Fig. 7.



T. A. Edison

1
abandoned Caveat.

Case 523

Fig. 1.

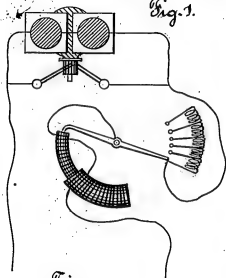


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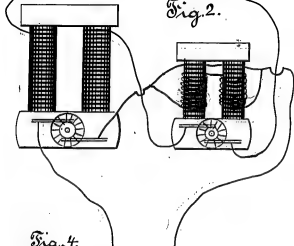


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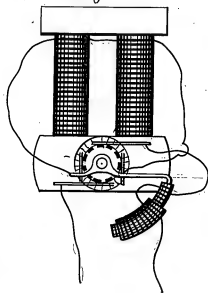
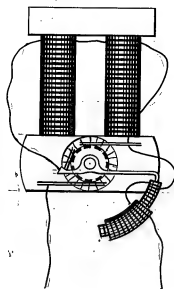
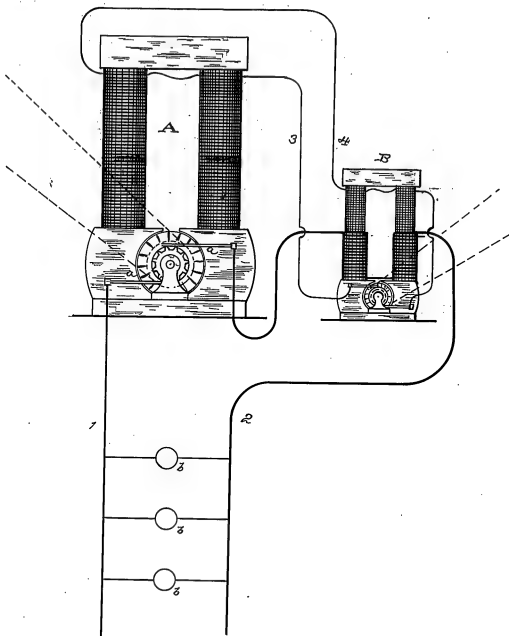


Fig. 3.



T. A. Edison

523



ATTEST:

E. C. Rowland
Wm. A. Seely

INVENTOR,

Fig. 1.

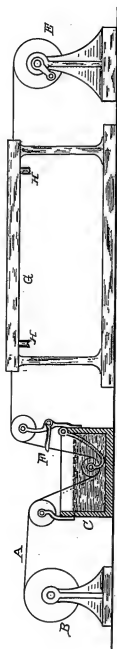


Fig. 2.



Fig. 3.



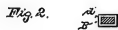
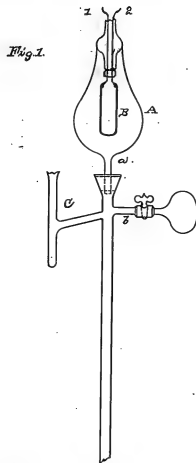
Fig. 4.



ATTEST:
E. C. Howland

INVENTOR.

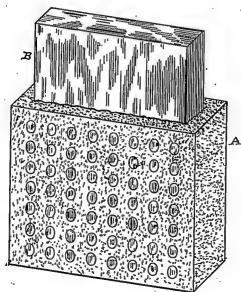
529



ATTEST:
Edward C. Rowland

INVENTOR:

530



ATTEST:
G. B. Rawlands

INVENTOR:

531

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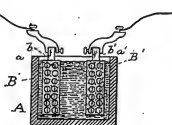
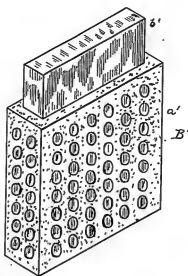


Fig. 2.



ATTEST:

E. C. Rowlands

INVENTOR:

533

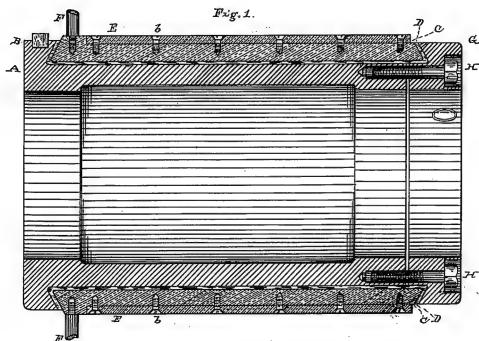
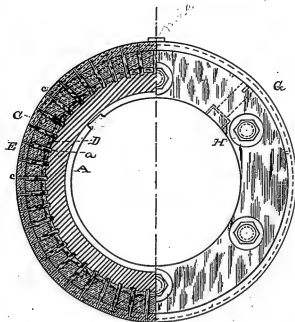


Fig. 2.



ATTEST:
Edmund C. Rowland

INVENTOR,

539

Fig. 1.

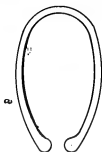


Fig. 2.

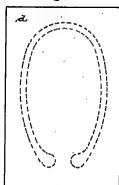


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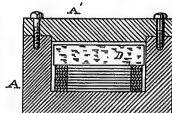


Fig. 4.



Fig. 5.

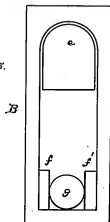


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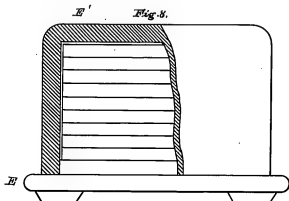


Fig. 7.

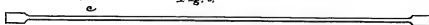
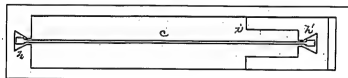


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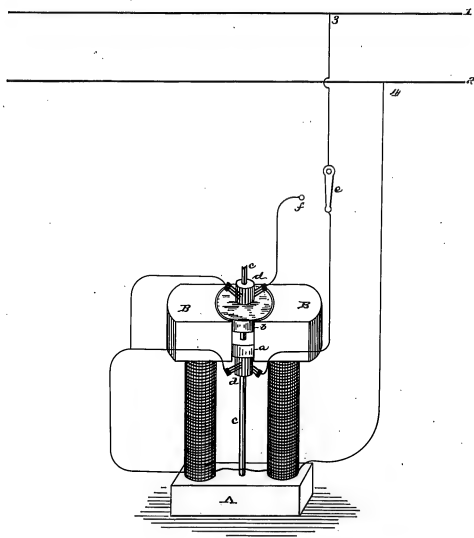


ATTEST:

C. C. Rowlands

INVENTOR:

546



ATTEST,

E. C. Howland

INVENTOR,

Fig. 1.

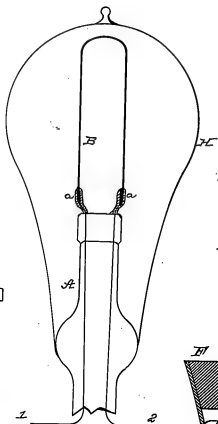


Fig. 2.

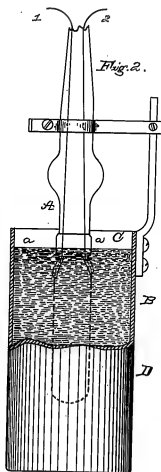
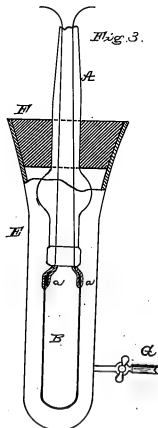


Fig. 3.



ATTEST,
E. C. Rowland

INVENTOR

558

558

Fig. 1.

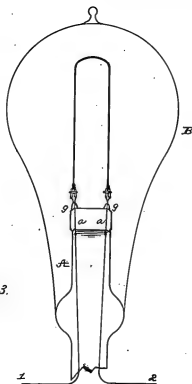


Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 7.

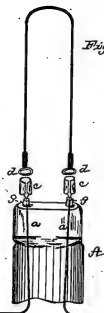


Fig. 8.



Fig. 9.



Fig. 6.



ATTEST:

E. C. Rowlands

INVENTOR:

Fig. 1

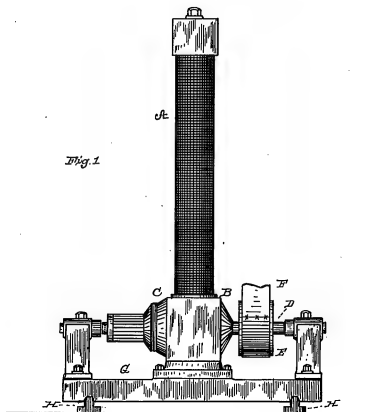
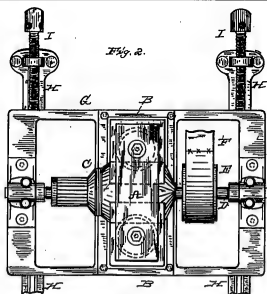


Fig. 2.



ATTEST:

E. C. Rowland

INVENTOR:

584

Fig. 2.

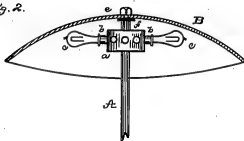


Fig. 1.

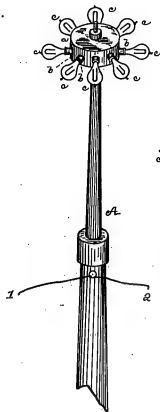
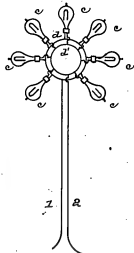


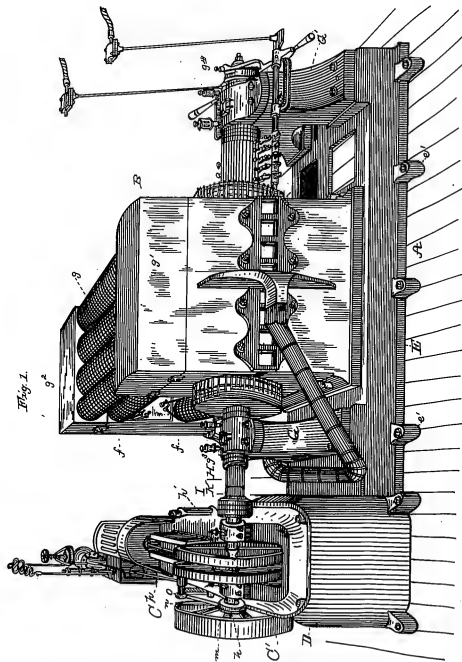
Fig. 3.



ATTEST

C. C. Rowland

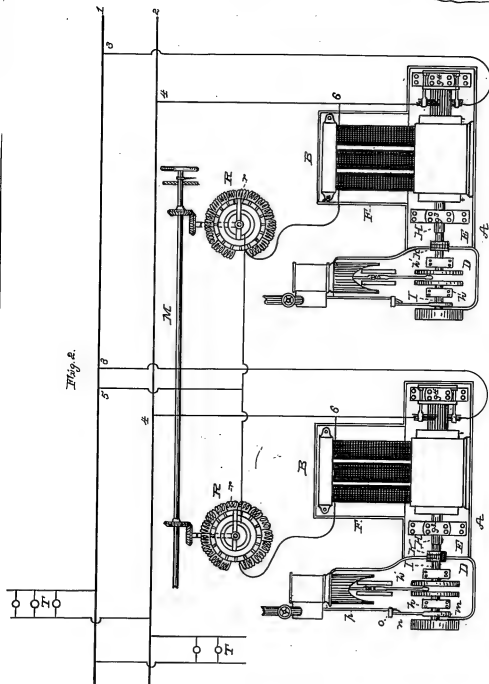
INVENTOR



ATTEST

S. C. Rowland

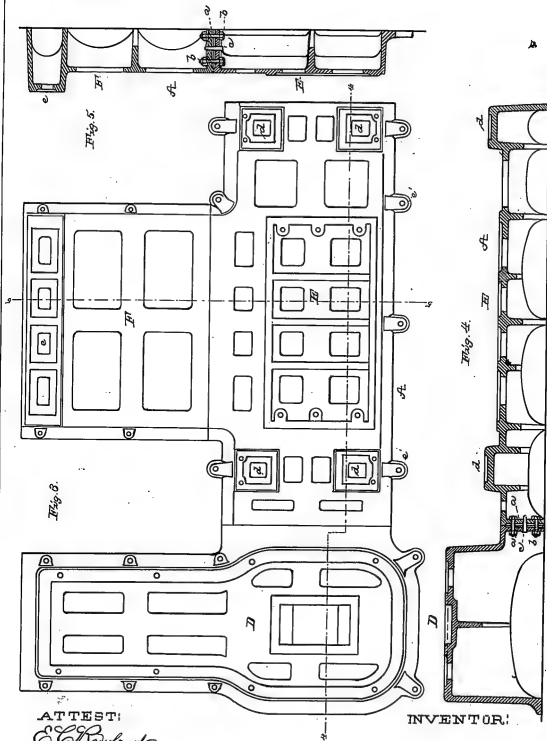
INVENTOR



ATTEST:

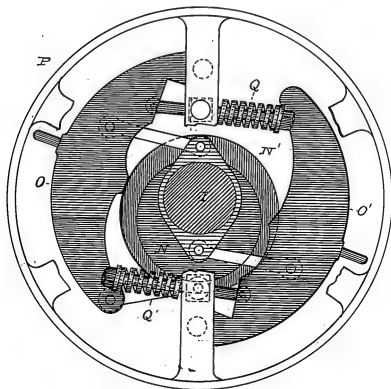
E. D. Rowland

INVENTOR



592

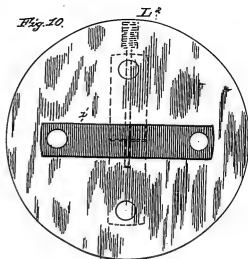
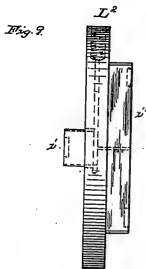
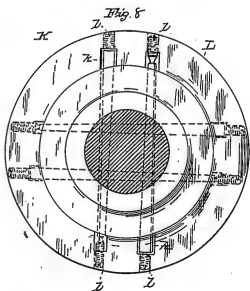
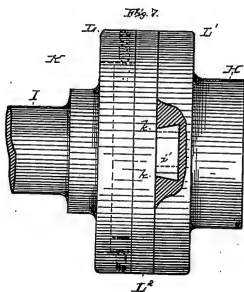
Fig. 6.



ATTEST:

E. P. Rowland

INVENTOR:



AT TEST:

INVENTOR:

595

Fig. 1.

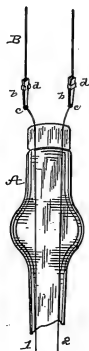
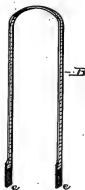


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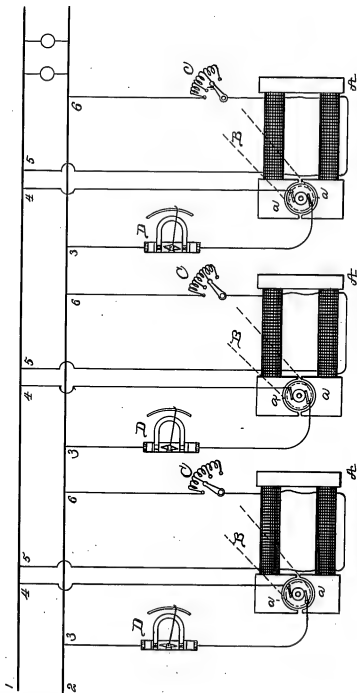


Fig. 3.



ATTEST:
E. C. Rowland

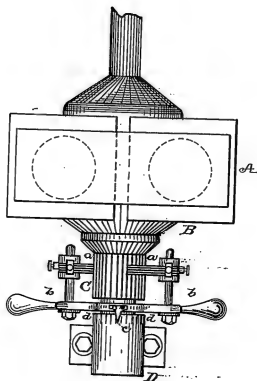
INVENTOR:



ATTEST:
Edw. Rowland

INVENTOR

611

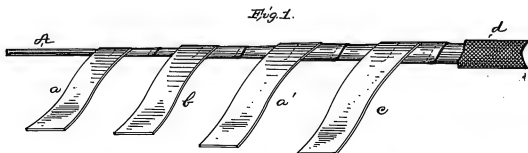


WITNESSES:

E. F. Rowland

INVENTOR:

614

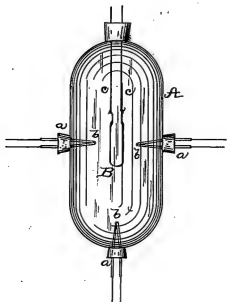


WITNESSES:

E. B. Rowland

INVENTOR:

6/6



WITNESSES:

E. Rowland

INVENTOR:

Fig 1

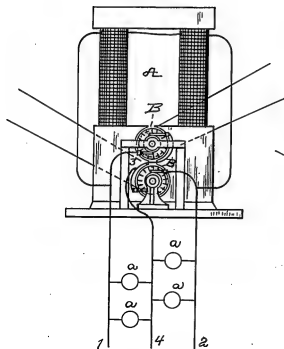


Fig 3

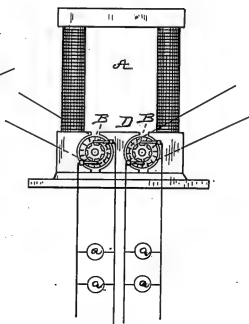


Fig 2

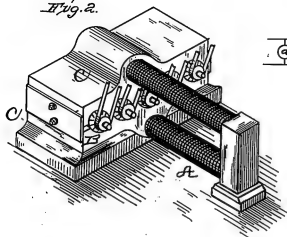
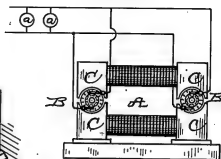


Fig 4



ATTEST:

E. Rowland

INVENTOR:

Forfeited

4 Mils
Sheet 1

625

Fig. 1.

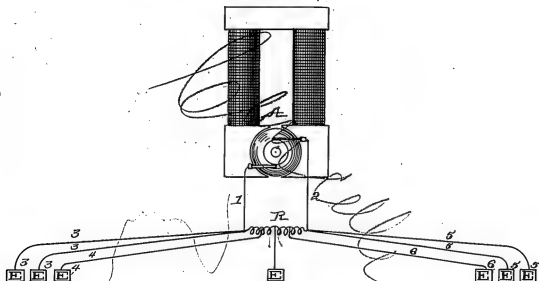


Fig. 4.

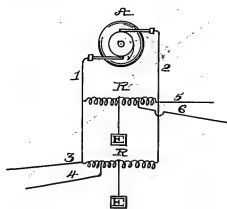
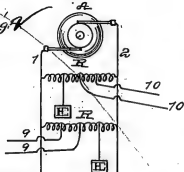


Fig. 7.



AT TEST

Fig. 3.

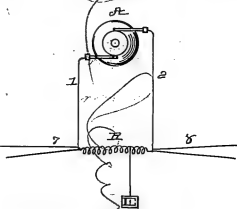
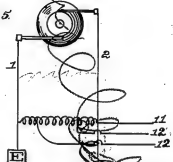


Fig. 5.



INVENTOR:

625

Fig 3

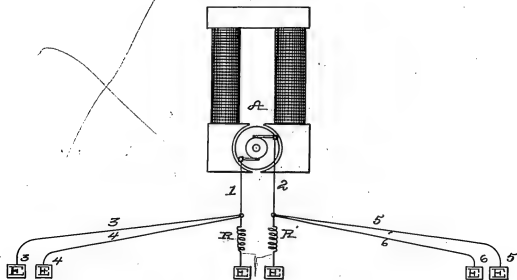
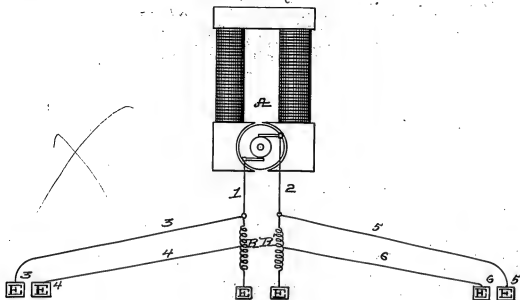


Fig 4



ATTEST,

INVENTOR,

625

Fig. 3

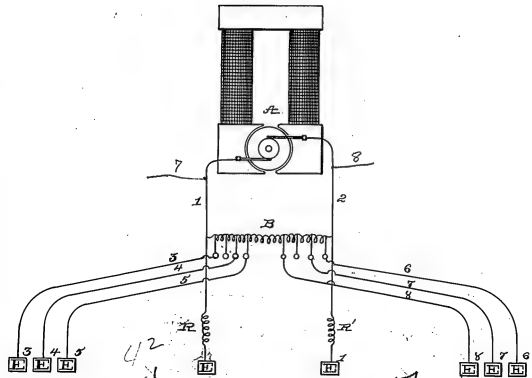


Fig. 4

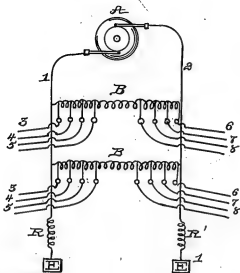
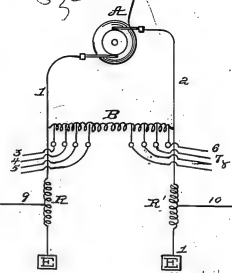


Fig. 5

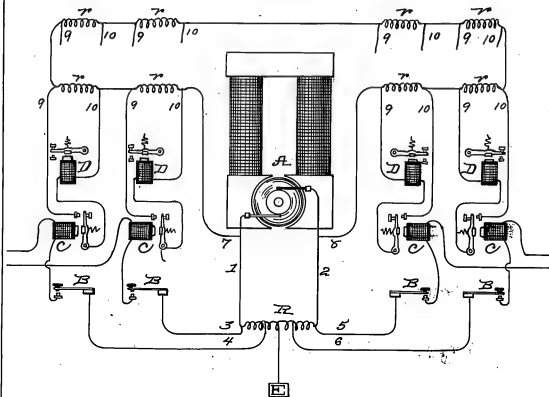


ATTEST:

Edw. Rowland

INVENTOR.

625

4 sheets
Sheet 446
Fig. 12

ATTEST:

Ed. Rowland

INVENTOR:

Abandoned

626

Fig. 1.

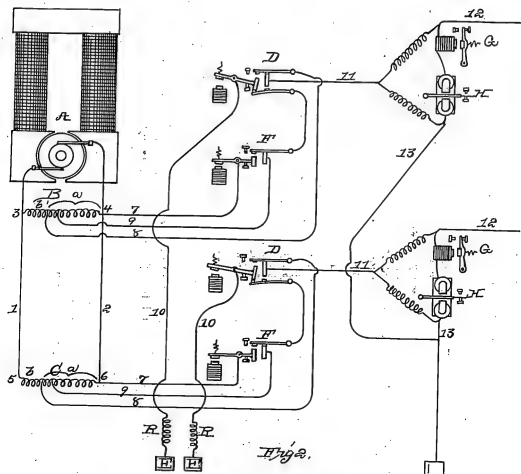
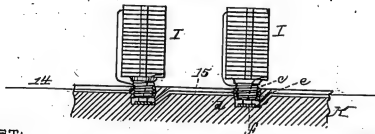


Fig. 2.



ATTEST:
E. A. Pearson

INVENTOR:

J. A. Edison

Abandoned
662

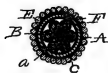
Fig. 1



Fig. 2.



Fig. 3.



ATTEST:
E. J. Pauland

INVENTOR:

Traced Jan 29th 1886
E. J. Pauland

670

Abandoned

FIGS.

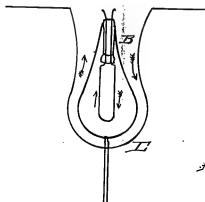
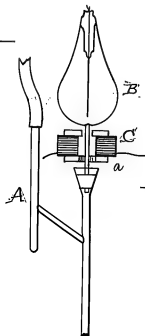


Fig 1.



FIGS.

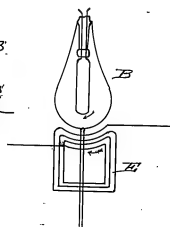


Fig 6.

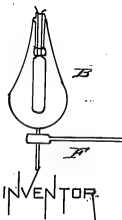
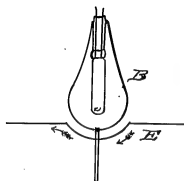


Fig. 2.



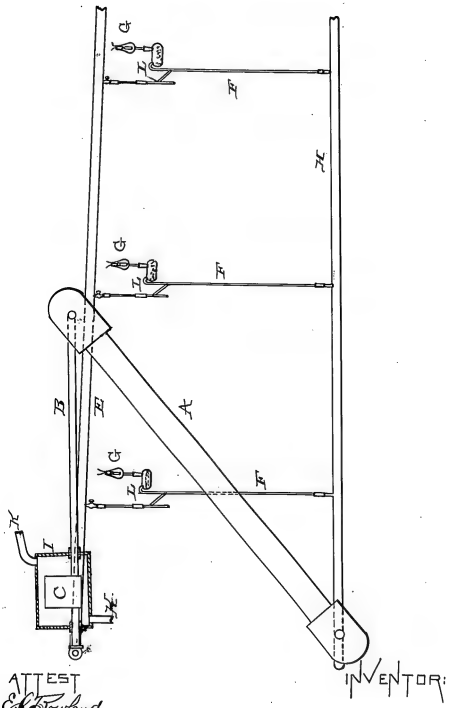
ATTEST
J. B. Rowland

INVENTOR

Filed July 12th 1886

Abandoned

675



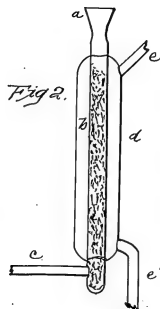
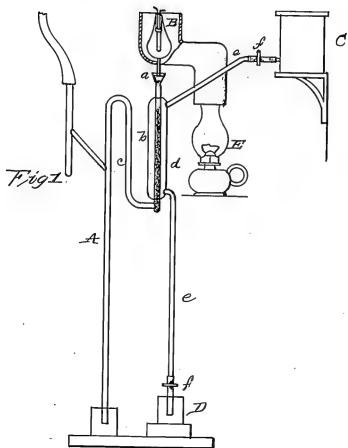
ATTEST
E. C. Fowland

INVENTOR:

Traced Aug 3rd 1881
E. C. Fowland

676

Abandoned



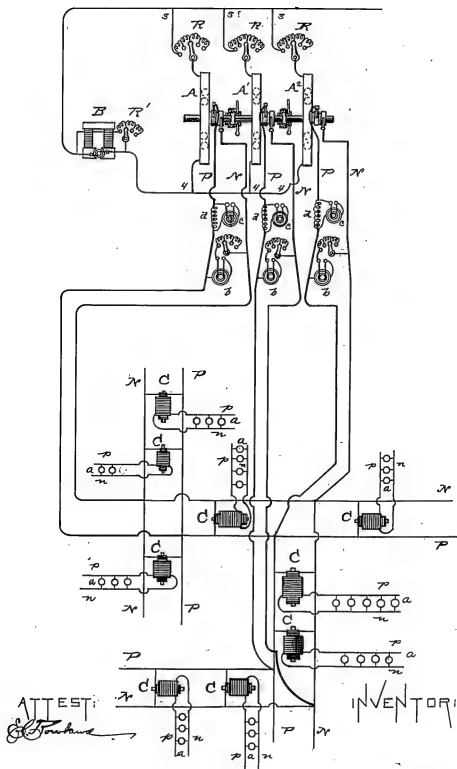
ATTEST:
E. F. Fowland

INVENTOR:
E. F. F.

Traced July 30th 1886
E. F. F.

699.

Abandoned



Filed Nov 3rd 1886

E. F. F. F.

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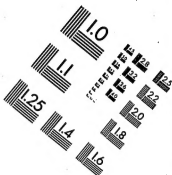
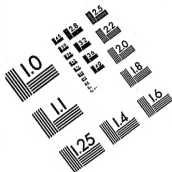
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